

## HAZARD RANKING SYSTEM (HRS) DOCUMENTATION RECORD COVER SHEET

**Name of Site:** Flash Cleaners

**EPA ID No.:** FLD083111005

### **Contact Persons**

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### **Pathways, Components, or Threats Not Scored**

The surface water migration, soil exposure, and air migration pathways were not scored in this Hazard Ranking System (HRS) documentation record because they are not expected to significantly contribute to the overall site score.

**Surface Water Migration Pathway:** No surface water or sediment samples have been collected on, or in the vicinity of, the Flash Cleaners property (References (Ref.) 10, pages [pp.] 8, 9, Figure 4; 21, p. 21, Figure 3). The ground surface surrounding the sources is covered with asphalt (Ref. 21, Figure 2; 37, p. 15). Drainage features were not observed during the expanded site inspection (ESI); all runoff is surface runoff (Refs. 21, p. 21; 38, p. 6). Surface water runoff is expected to enter drainage canals located east of North Federal Highway (Refs. 5; 21, p. 21). The drainage canals discharge into the Hillsboro River then into the Atlantic Ocean (Refs. 5; 21, p. 21). Several federally designated endangered and threatened species inhabit surface water bodies in Broward County, Florida; however, specific habitat locations are not known (Ref. 48). This pathway does not significantly impact the overall site score; therefore, the surface water migration pathway was not scored in this HRS documentation record.

**Soil Exposure Pathway:** Site-related contaminants have been detected in surface soil samples collected from 0 to 2 feet below land surface (Ref. 10, pp. 23, 24). A residential area is located to the west of the Flash Cleaners property (Refs. 5; 37, p. 15). However, surface soil samples have not been collected on residential properties (Refs. 10, Figure 4; 37, p. 15). Access to the property is unrestricted; nearby residents use the access road located on the Flash Cleaners property as a shortcut to the residential area to the west of the facility (Ref. 37, pp. 15, 16). The population within 1 mile is about 15,632 people (Ref. 42). This pathway does not significantly impact the overall site score; therefore, the soil exposure pathway was not scored in this HRS documentation record.

**Air Migration Pathway:** No air samples were collected at the Flash Cleaners property during the ESI (Ref. 21, p. 22). The residential population within 4 radial miles of the property is about 146,072 people (Ref. 42). No wetlands are located in the immediate vicinity (Ref. 49). Several federally designated endangered and threatened species inhabit Broward County, Florida; however, specific habitat locations are not known (Ref. 48). This pathway does not significantly impact the overall site score; therefore, the air migration pathway was not scored in this HRS documentation record.

## HAZARD RANKING SYSTEM (HRS) DOCUMENTATION RECORD

Name of Site: Flash Cleaners

EPA Region: 4

Date Prepared: March 2008

Street Address of Site\*: 4131 North Federal Highway

City, County, State, Zip: Pompano Beach, Broward County, Florida 33064

General Location in the State: Southeastern portion of state, near the Atlantic Ocean

Topographic Map: Boca Raton, Florida, 1962

Latitude: 26.2824° North

Longitude: 80.0969° West

The coordinates above for Flash Cleaners were measured from the northwestern corner of the Flash Cleaners building (Ref. 5).

\* The street address, coordinates, and contaminant locations presented in this HRS documentation record identify the general area in which the site is located. They represent one or more locations EPA considers to be part of the site based on the screening information EPA used to evaluate the site for NPL listing. EPA lists national priorities among the known “releases or threatened releases” of hazardous substances; thus, the focus is on the release, not precisely delineated boundaries. A site is defined as where a hazardous substance has been “deposited, stored, placed, or otherwise come to be located.” Generally, HRS scoring and the subsequent listing of a release merely represent the initial determination that a certain area may need to be addressed under CERCLA. Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will be refined as more information is developed as to where the contamination has come to be located.

Migration Pathway	Pathway Score
Ground Water Migration Pathway	100.00
Surface Water Pathway	NS
Soil Exposure Pathway	NS
Air Migration Pathway	NS
<b>HRS SITE SCORE</b>	<b>50.00</b>

Note:

NS Not scored

# WORKSHEET FOR COMPUTING HRS SITE SCORE

	<b>S pathway</b>	<b>S<sup>2</sup> pathway</b>
Ground Water Migration Pathway Score (S <sub>gw</sub> )	100	10,000
Surface Water Migration Pathway Score (S <sub>sw</sub> )	NS	NS
Soil Exposure Pathway Score (S <sub>s</sub> )	NS	NS
Air Migration Score (S <sub>a</sub> )	NS	NS
$S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		10,000
$(S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2)/4$		2,500
$\sqrt{(S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2)/4}$		50.00

Note:

NS = Not scored

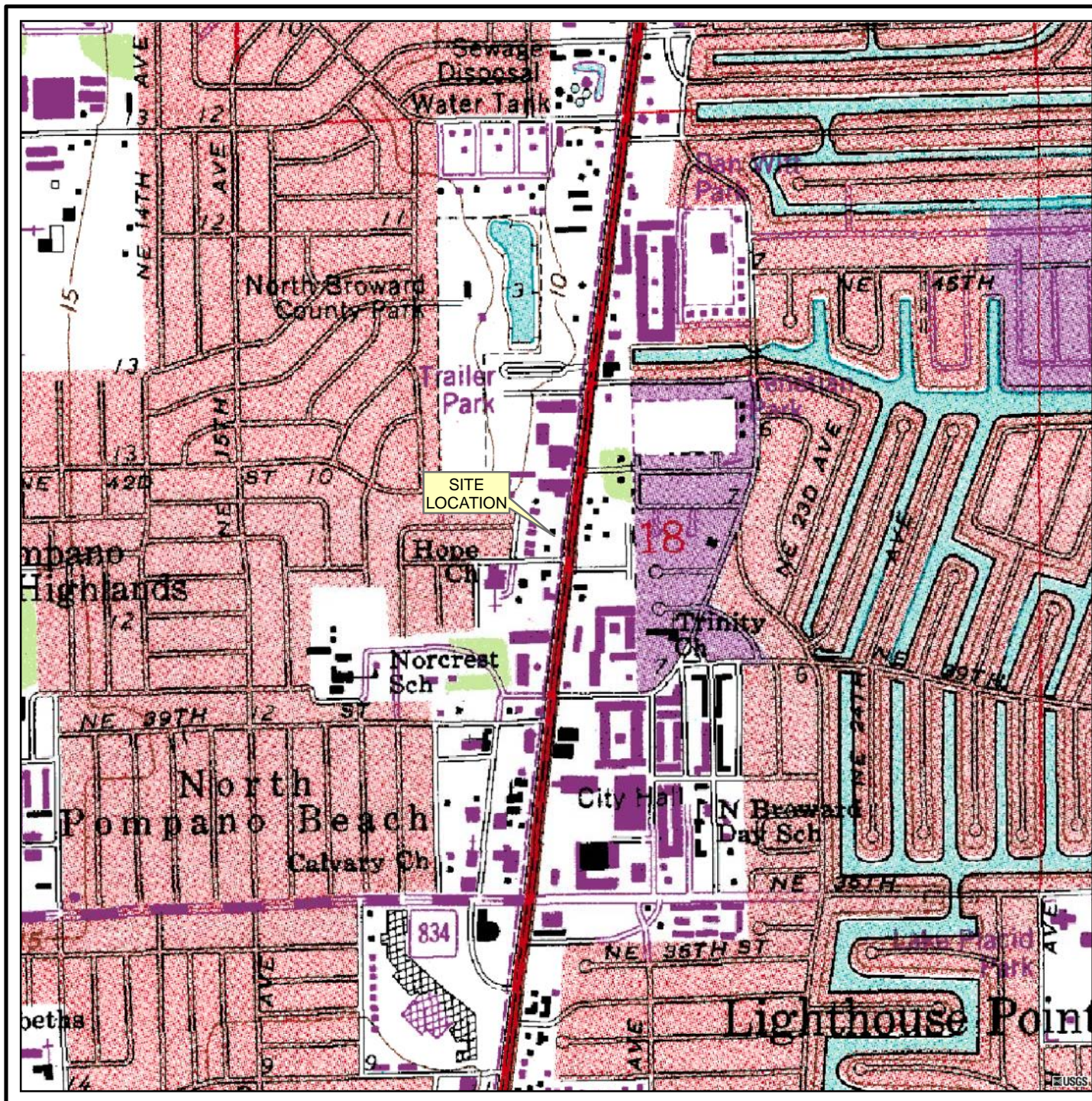
**Table 3-1 --Ground Water Migration Pathway Scoresheet**  
**Aquifer Evaluated: Biscayne Aquifer**

Factor Categories and Factors	Maximum Value	Value Assigned	
<b>Likelihood of Release to an Aquifer:</b>			
1. Observed Release	550	550	
2. Potential to Release:			
2a. Containment	10	NS	
2b. Net Precipitation	10	NS	
2c. Depth to Aquifer	5	NS	
2d. Travel Time	35	NS	
2e. Potential to Release [lines 2a(2b + 2c + 2d)]	500	NS	
3. Likelihood of Release (higher of lines 1 and 2e)	550		550
<b>Waste Characteristics:</b>			
4. Toxicity/Mobility	(a)	10,000.00	
5. Hazardous Waste Quantity	(a)	10	
6. Waste Characteristics	100		18
<b>Targets:</b>			
7. Nearest Well	50	9	
8. Population:			
8a. Level I Concentrations	(b)	0.00	
8b. Level II Concentrations	(b)	0.00	
8c. Potential Contamination	(b)	3,415.3	
8d. Population (lines 8a + 8b + 8c)	(b)	3,415.3	
9. Resources	5	0	
10. Wellhead Protection Area	20	5.00	
11. Targets (lines 7 + 8d + 9 + 10)	(b)		3,429.3
<b>Ground Water Migration Score for an Aquifer:</b>			
12. Aquifer Score [(lines 3 x 6 x 11)/82,5000] <sup>c</sup>	100		100.00
<b>Ground Water Migration Pathway Score:</b>			
13. Pathway Score (S <sub>gw</sub> ), (highest value from line 12 for all aquifers valuated) <sup>c</sup>	100		100.00
<sup>a</sup> Maximum value applies to waste characteristics category			
<sup>b</sup> Maximum value not applicable			
<sup>c</sup> Do not round to nearest integer			

Note:

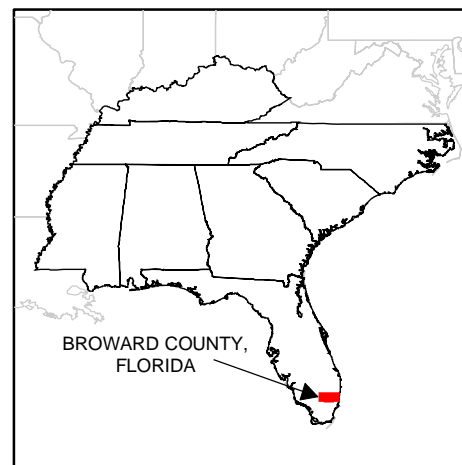
NS = Not scored





0 500 1,000  
Feet  
1:12,000

MAP SOURCE:  
USGS, BOCA RATON  
TOPOGRAPHIC QUADRANGLE, 1962



United States Environmental Protection Agency

FLASH CLEANERS  
POMPANO BEACH,  
BROWARD COUNTY,  
FLORIDA  
TDD No. TTEMI-05-003-0027

**FIGURE 1**  
**SITE LOCATION**







## LEGEND

- ✕ ✕ Fence
- Structure



0 30 60  
1:720 Feet

MAP SOURCE:  
REFERENCES 10, p.18; 21, p.A2; 58

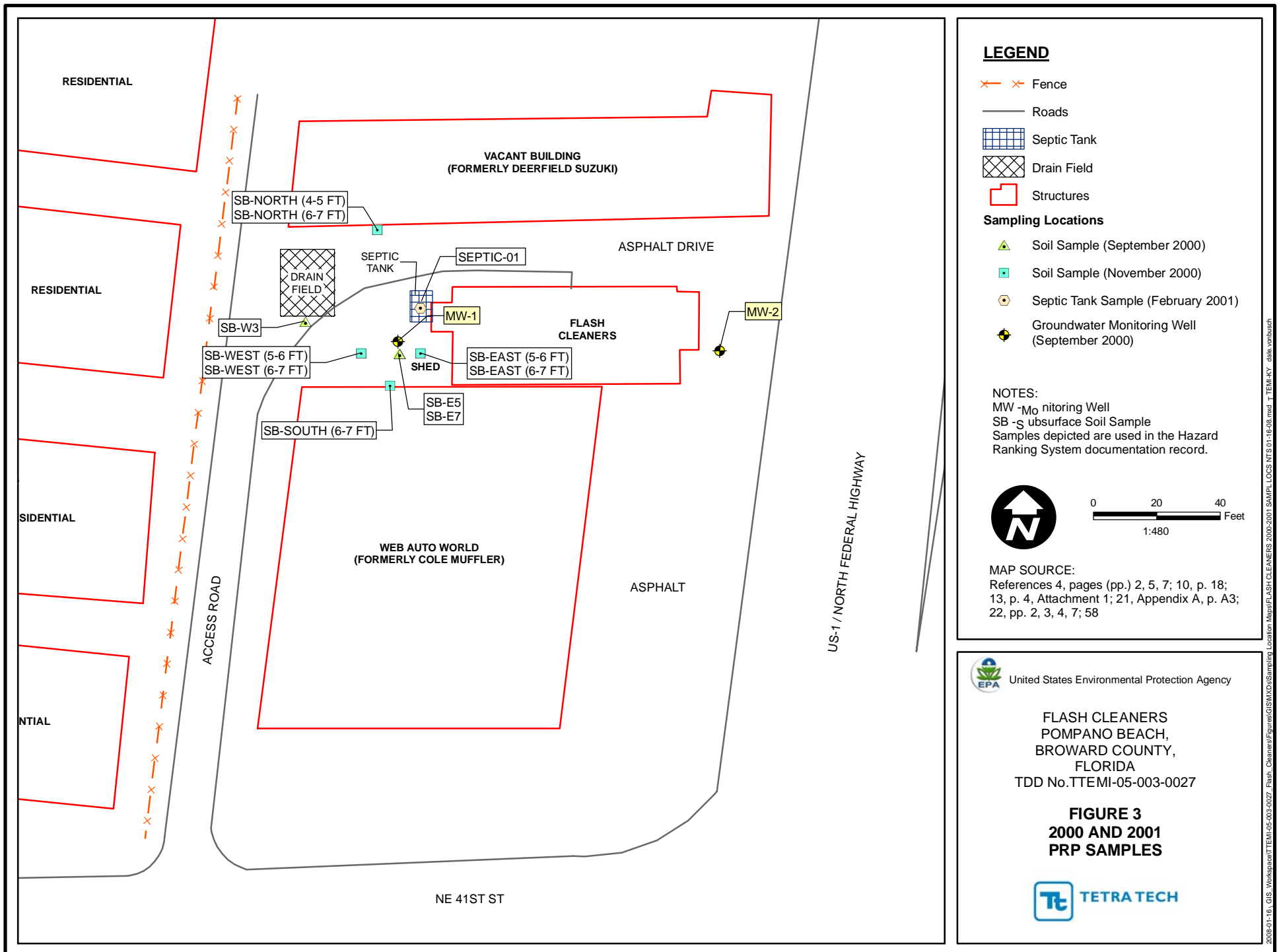


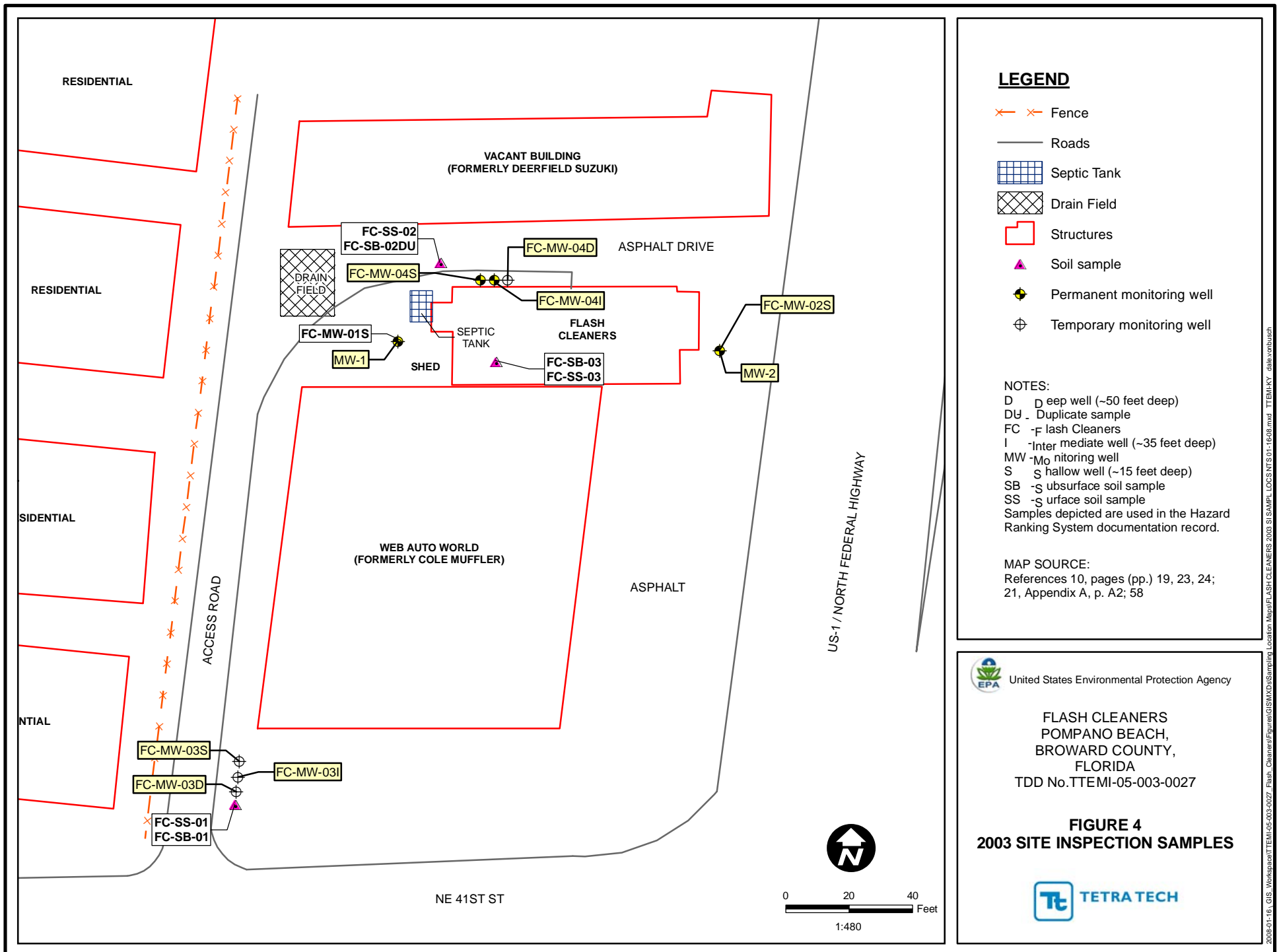
United States Environmental Protection Agency

FLASH CLEANERS  
POMPANO BEACH,  
BROWARD COUNTY,  
FLORIDA  
TDD No.TTEMI-05-003-0027

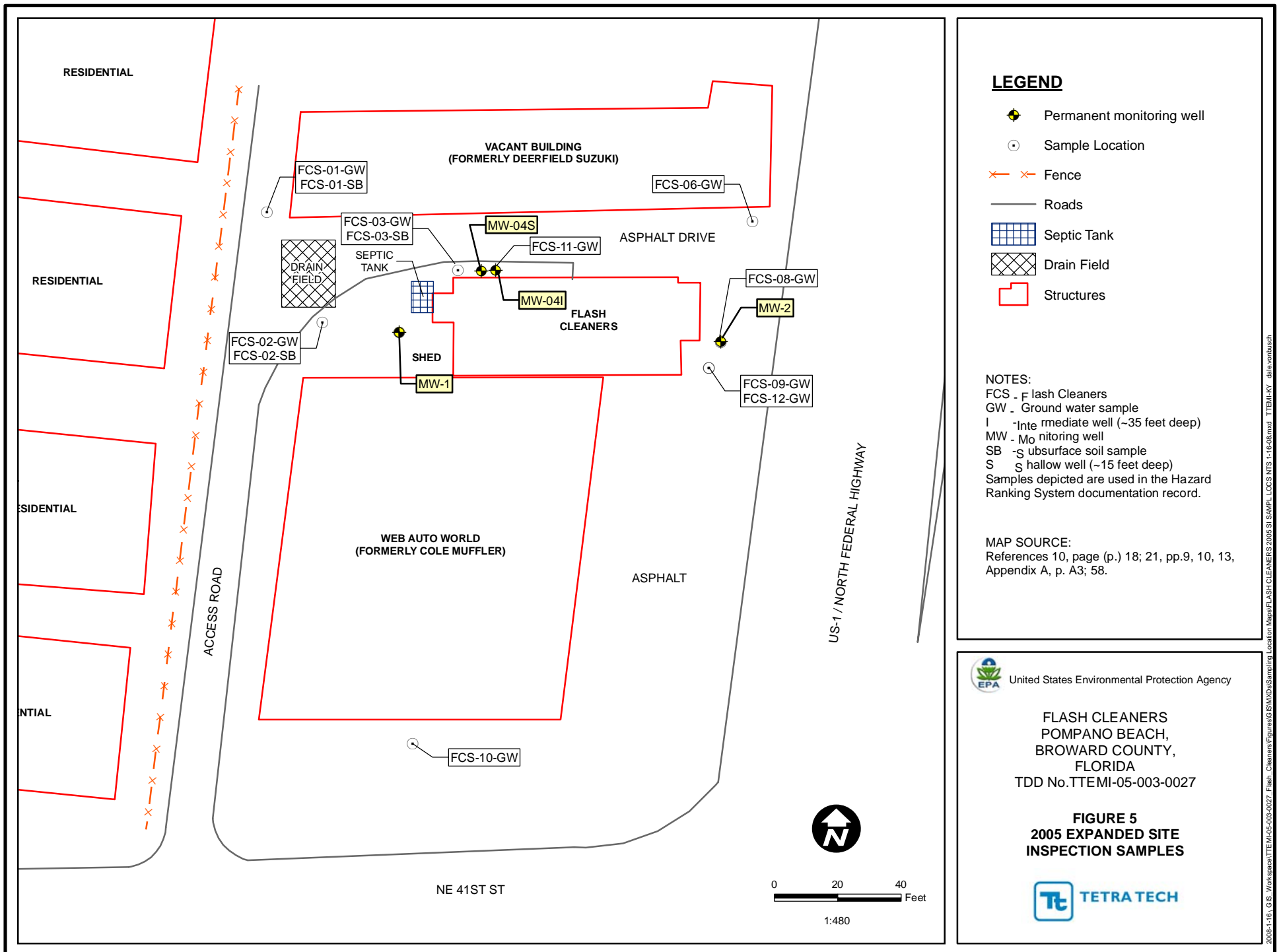
**FIGURE 2  
SITE LAYOUT**











## REFERENCES

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## **SITE DESCRIPTION**

Flash Cleaners has an area of about a 0.5 acre and is located at 4131 North Federal Highway, Pompano Beach, Broward County, Florida (References [Refs.] 3, p. 4; 5; 9, p. 5; 10, p. 3; 36, p. 2) (see Figure 1 of this Hazard Ranking System [HRS] documentation record). More specifically, the geographic coordinates, as measured from the northwestern corner of the Flash Cleaners building are latitude 26.2824° (26° 16' 57") north and longitude 80.0969° (80° 5' 49") west (Ref. 59). The EPA identification number as recorded in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) data base is FLD083111005 (Ref. 36, p. 2). Land uses surrounding the property are predominately commercial and residential (Refs. 9, p. 5; 10, p. 3). A school is located approximately 1,500 feet southwest of the property and several residential areas are nearby, including one residential area adjacent to the western side of the property (Refs. 5; 37, p. 15; 38, p. 6). A vacant building is located adjacent to the property to the north and an auto repair business (Web Auto World) is located adjacent to the property to the south (Ref. 37, p. 15). U.S. 1/North Federal Highway is located to the east of the property (see Figure 2 of this HRS documentation record). Access to the property is unrestricted (Ref. 38, p. 6). The Flash Cleaners property consists of a building, a parking lot, and an access road (Refs. 21, p. 2, 3; 37, p. 15). The building is approximately 1,789 square feet (Ref. 3, p. 4) with a covered shed extending from the western side (Ref. 37, p. 15). A septic tank and drain field are located at the northwestern corner of the building (Refs. 21, p. A-3; 37, p. 15). Municipal sewer service is not yet available in the vicinity of the Flash Cleaners property; therefore, the septic tank is still in use (Ref. 57). The Flash Cleaners building occupies most of the property and most of the area surrounding the building is covered with pavement (Refs. 4, p. 5; 37, p. 15). The Flash Cleaners building shares a common wall with the building located immediately to the south, which houses Web Auto World (Ref. 37, p. 15). A former storage area reportedly was located at the back or western side of the Flash Cleaners building. This storage area was covered with a roof, but had no walls or flooring (Ref. 7, p. 2). The former storage area appears to be the current location of the Flash Cleaners shed (Refs. 7, p. 2; 21, Appendix D, p. D5).

## **OPERATIONAL AND REGULATORY HISTORY**

Flash Cleaners was operated as a dry cleaning facility from 1977 to approximately 2001 (Ref. 9, p. 5). Tetrachloroethylene (PCE) or "perc" was used as a dry cleaning solvent (Refs. 6, p. 1; 7, p. 1). A previous owner may have also used the building as a dry cleaning facility; however, information regarding these past operations is unclear (Ref. 10, p. 3). Dry cleaning operations have been discontinued at the facility, and the owners do not have a hazardous materials license with the county to conduct dry cleaning activities. The facility is currently being used as a drop-off location for outsourced dry cleaning services (Ref. 3, p. 1).

On February 17, 1999, the Florida Department of Environmental Protection (FDEP) Southeast District Office conducted an inspection of the facility (Ref. 11, p. 1). During the inspection, FDEP personnel noted the presence of two dry cleaning machines at the facility; one machine was operational and one was non-operational (Refs. 6, p. 1; 7, p. 1; 11, p. 1). Also, the non-operational machine contained dry cleaning product and was located on a bare concrete floor with no secondary containment structures (Refs. 6, pp. 1-2; 7, p. 1; 11, p. 1). FDEP personnel also noted that the waste containers located inside the facility lacked secondary containment and waste material was possibly disposed of onto the ground surface (Refs. 6; 10, p. 3). Subsequently in February 1999, the non-operational machine was drained. The PCE that was in the non-operational unit was transferred to the operational machine (Refs. 6; 7, p. 2; 8). The filters in the non-operational unit were disposed of as hazardous waste (Refs. 7, p. 2; 8), and the unit was removed for scrap (Refs. 7, p. 2; 8).

Subsequently in 1999, the owner of Flash Cleaners submitted an application for participation in FDEP's Drycleaning Solvent Cleanup Program; however, the application was denied (Ref. 12, p. 1). In a letter dated May 25, 1999, FDEP notified the owner of Flash Cleaners that the facility was ineligible for the program due to the lack of secondary containment. The letter of correspondence indicated that failure to



have secondary containment constitutes “gross negligence.” FDEP further stated in the May 25, 1999 letter that “facilities operated in a grossly negligent manner at any time on or after November 19, 1980, shall not be eligible to participate in this Program” (Ref. 12, p. 1).

In November 2000, the Broward County (BC) Department of Planning and Environmental Protection (DPEP), Pollution Prevention and Remediation Division (PPRD) notified the owner of Flash Cleaners that a review of soil analytical results submitted on November 21, 2000 does not indicate the presence of a significant contaminant source and an Interim Source Removal was not necessary (Ref. 14). In the same November 2000 letter, BCDPEP notified the property owner that a site assessment should be performed to determine the extent of ground water contamination (Ref. 14). Because the owner did not submit the requested site assessment report, the BCDPEP issued the owner a Notice of Violation and Notice of Hearing to Assess a Civil Penalty on January 23, 2002 (Ref. 15). A Final Order was issued on March 28, 2002 concluding that the owner was in default, and civil penalties were assessed (Ref. 16, p. 6).

A small diesel fuel spill occurred at the rear of the facility on June 5, 2003. The spill of approximately 30 gallons of diesel fuel reportedly occurred while a partially filled, aboveground storage tank (AST) was being loaded onto a truck by Lank Oil Company (Refs. 10, p. 4; 17, pp. 1, 2, A-2). Most of the spilled fuel accumulated in a 2-foot by 4-foot depressed area. A smaller 1-foot by 3-foot area was also impacted. Some of the fuel spread over the asphalt-paved driveway and was absorbed using absorbents on the same day (Ref. 17, p. 3). Representatives of the FDEP Emergency Response Section investigated the spill on June 11, 2003 (Ref. 10, p. 4). The spill areas were cleaned up through excavation and removal of the impacted soils and confirmation sampling on June 26, 2003 by H<sub>2</sub>O Environmental, a private contractor for Lank Oil (Refs. 17, pp. 1, 2, 3; 18, pp. 1, 2). On February 28, 2004, the PPRD of the BCDPEP notified Lank Oil Company that based on the results of the confirmation sampling, no further activities related to the petroleum discharge were necessary (Ref. 19). Further, the discharge was recorded in the State of Florida petroleum tank registration and cleanup database as “Discharge Minor, Cleanup Not Required” (Ref. 18, pp. 1, 2).

## **PREVIOUS INVESTIGATIONS**

In September 2000, REP conducted a limited site assessment at the facility, on behalf of Flash Cleaners. During the assessment, two soil borings were advanced and sampled: one at the back entrance of the Flash Cleaners building immediately south of the septic tank (SB-E), and one south of the septic tank drain field in the western-most portion of the property (SB-W) (Ref. 13, p. 2, Attachment 1) (also see Figure 3 of this HRS documentation record). Soil samples from the soil borings were screened at 1-foot intervals with an organic vapor analyzer equipped with a flame ionization detector (Ref. 13, p. 2). Subsurface soil samples from SB-E were collected at 5 feet below ground surface (bgs) (unsaturated soils) (sample SB-E5) and 7 feet bls (soil/water interface) (sample SB-E7); and subsurface soil samples from SB-W were collected from 3 feet bgs (unsaturated soils) (sample SB-W3) and 7 feet bls (soil/water interface) (sample SB-W7) (Ref. 13, p. 2, Attachment 1, Attachment 3, p. 13). Soil screening results from samples collected south of the septic tank drain field (SB-W) revealed the presence of hydrocarbons at concentrations of 0.30 part per million (ppm) at 0 to 1 foot bls and 1 ppm at 2 to 3 feet bgs. Soil screening results from samples collected at the back door near the septic tank (SB-E) revealed the presence of hydrocarbons at concentrations ranging from 0.20 ppm (1 to 2 feet bgs) to 910 ppm (6 to 7 feet bgs) (Ref. 13, Attachment 2). Analytical results of subsurface soil samples collected from SB-E5 revealed hazardous substances at the following concentrations: cis-1,2- dichloroethene (DCE) (86 parts per billion [ppb]) and tetrachloroethene (PCE) (293 ppb); and SB-E7 revealed hazardous substances at the following concentrations: cis-1,2-DCE (2,260 ppb), trichloroethene (TCE) (11.8 ppb), and PCE (704 ppb) (Ref. 13, Attachment 3, pp. 7, 8, 10, 11, 13). Analytical results of subsurface soil samples collected from SB-W3 revealed the presence of PCE at 15.1 ppb (Ref. 13, Attachment 3, pp. 5, 13). PCE was used as a dry cleaning solvent at the Flash Cleaners facility (Ref. 6, p. 1). TCE and DCE are degradation products of PCE (Refs. 35, pp. 1, 189, 190; 46, pp. 2, 81; 47, pp. 2, 169).

Also in September 2000, two permanent monitoring wells were installed to a depth of 15 feet bgs and sampled during the limited site assessment. MW-1 was collocated with SB-E and MW-2 was installed in the eastern portion of the parking lot (Ref. 13, pp. 2, 3, Attachment 1, Attachment 4). Analytical results for MW-1 located at the back door near the septic tank contained cis-1,2-DCE (2,700 ppb) and trans-1,2-DCE (6.2 ppb) (Ref. 13, Attachment 6, p. 2). All parameters were below their respective detection limits in the ground water sample collected from MW-2 (Ref. 13, Attachment 6, p. 3). As a result of the investigation, REP recommended further assessment at Flash Cleaners (Ref. 13, p. 6).

In November 2000, REP collected additional subsurface soil samples at depths ranging from 4 to 7 feet bgs from four soil borings advanced at various locations surrounding the septic tank on the Flash Cleaners property (Ref. 22, p. 7, Attachment 3, p. 25). The highest concentrations of hazardous substances detected in the soil borings include cis-1,2-DCE at 1.6 ppm in sample SB-East (5 – 6 feet [ft]); cis-1,2-DCE at 1.3 ppm in sample SB-East (6 – 7 ft); PCE at 0.18 ppm in sample SB-North (4 – 5 ft); and TCE at 0.052 ppm in sample SB-North (4 – 5 ft) (Ref. 22, p. 3, Attachment 3, pp. 2, 5, 20, 25). The highest concentrations of hazardous substances were detected near the septic tank (Ref. 22, pp. 3, 7).

In December 2000, REP conducted ground water screening on the Flash Cleaners property. Ground water samples collected using direct push technology at depths ranging from 15 to 39 feet bgs was analyzed using a mobile laboratory (Ref. 4, p. 3). Screening results of the ground water sample (GP-6) collected nearest to the Flash Cleaners septic tank revealed the highest concentrations of total halogenated VOCs at the following depths: 20,901 ppb at 15 feet bgs; 174 ppb at 29 feet bgs; and 675 ppb at 39 feet bgs (Ref. 4, pp. 4, 5, Attachment 1, pp. 16 to 18). The concentrations of the individual halogenated VOCs detected in each ground water sample were added to obtain the total halogenated VOC concentration for each sample. In some cases, the concentrations reported were rounded (Ref. 4, pp. 4, 5, Attachment 1, pp. 16 to 18).

On February 28, 2001, REP collected a sludge sample from the Flash Cleaners septic tank (Ref. 4, Attachment 2, p. 6). The sludge sample was analyzed for total halogenated VOCs using EPA SW-846 Method 8021B and for halogenated VOCs using the toxicity characteristics leaching procedure (TCLP) (EPA SW-846 Method 1311/8021) (Ref. 4, pp. 6, 7, Attachment 2). Total VOCs results indicated the presence of PCE (61,000,000 micrograms per kilogram [ $\mu\text{g/kg}$ ]) and cis-1,2-DCE (4,900,000  $\mu\text{g/kg}$ ); and TCLP VOCs results indicated the presence of PCE (270 milligrams per liter [ $\text{mg/L}$ ]) and TCE (30  $\text{mg/L}$ ). Concentrations of PCE and TCE were above the Resource Conservation and Recovery Act (RCRA) TCLP regulatory limits; therefore, the sludge removed from the septic tank was considered a hazardous waste that exhibited the characteristic of toxicity (Refs. 4, p. 7, Attachment 2; 41, p. 55). As a result, in April 2001, sludge in the septic tank was removed and the septic tank was cleaned and inspected (Ref. 4, p. 7).

In August 2002, FDEP prepared a preliminary assessment (PA) for Flash Cleaners. The PA consisted of a file review; no sampling was conducted during the PA. The PA concluded that further Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) action should be conducted at the property based on the proximity of municipal drinking water wells and surface water bodies that provide habitat for several endangered species (Ref. 9, pp. 1, 5, 6). EPA approved the PA in September 2002 (Ref. 9).

From June 9 to 11, 2003, Post, Buckley, Schuh & Jernigan, Inc. (PBS&J) conducted a site inspection (SI) at the property on behalf of FDEP (Ref. 10, p. 8). During the SI, four surface soil and three subsurface soil samples were collected (Ref. 10, p. 23). The sampling locations from the SI are depicted on Figure 4 of Reference 10 (Ref. 10, p. 19). Analytical results of the surface and subsurface soil samples collected north of the Flash Cleaners septic tank and beneath the floor of the Flash Cleaners building revealed elevated concentrations of site-related hazardous substances; the highest concentrations are as follows: TCE, 13J (estimated)  $\mu\text{g/kg}$ ; and PCE, 700J (estimated)  $\mu\text{g/kg}$  (Ref. 10, p. 24, Appendix A, pp. A5, A11). Sample FC-SB-03, which contained PCE at 700J  $\mu\text{g/kg}$ , was collected beneath the flooring at the southwestern corner of the Flash Cleaners building (Ref. 10, pp. 19, 20, 23, 24) and was analyzed at the medium concentration level (Ref. 53, pp. 2, 49). The concentration of an analyte is considered

significantly elevated for HRS purposes if the concentration is greater than or equal to three times the background concentration or greater than or equal to the sample quantitation limit if not detected in the background sample (Ref. 1, Section 2.3, Table 2-3).

During the PBS&J SI, 11 ground water samples were collected. Two ground water samples were collected from the existing monitoring wells, MW-1 and MW-2, and two were collected from monitoring wells installed during the SI, MW-4S (shallow) and MW-4I (intermediate). The other seven ground water samples were collected using the direct push technology. The ground water samples were collected from three intervals, including shallow, 15 feet below land surface (bls); intermediate, 35 feet bls; and deep, 50 feet bls (Ref. 10, pp. 8, 19, 23, Appendix B, pp. 1 to 11). The sampling locations from the SI are depicted on Figure 4 of Reference 10 (Ref. 10, p. 19). Ground water samples collected during the 2003 SI from wells located in the vicinity of the Flash Cleaners septic tank contained elevated concentrations of site-related hazardous substances. Samples from MW-4S, located on the northern side of the shed, contained the highest concentrations of hazardous substances at elevated concentrations including cis-1,2-DCE (5,600 micrograms per liter [ $\mu\text{g/L}$ ]; trans-1,2-DCE (31  $\mu\text{g/L}$ ), PCE (12  $\mu\text{g/L}$ ), TCE (34  $\mu\text{g/L}$ ), and vinyl chloride (6,800  $\mu\text{g/L}$ ) (Ref. 10, p. 26, Appendix A, p. A19). Analytical results of the ground water samples collected from the intermediate and deep wells (MW-4I and MW-4D) at this location also contained elevated concentrations of site-related hazardous substances (Ref. 10, p. 26, Appendix A, pp. A23, A24). PCE, cis-1,2-DCE, TCE, and vinyl chloride were detected above their respective EPA maximum contaminant levels (MCL) (Refs. 10, p. 26, Appendix A, pp. A19 to A29; 33, pp. 2, 4, 5). Based on the results of the SI, further CERCLA action was recommended for the facility (Ref. 10, p. 12).

From July 11 to 14, 2005, Weston, on behalf of EPA, conducted an expanded site inspection (ESI) at Flash Cleaners. During the ESI, Weston collected six surface soil, five subsurface soil, and 13 ground water samples from various locations throughout the property (Refs. 21, p. 7; 37; 38). The sample depths were as follows: surface soil, 0 to 6 inches bls; subsurface soil, 2 to 3 feet bls; and ground water samples from 12 to 15 feet bls (shallow wells) and 34 to 44 feet bls (deep wells) (Refs. 21, pp. 11, 14; 37, p. 14; 38, p. 6). Ten ground water samples were collected from temporary wells installed using direct push technology and three ground water samples were collected from existing permanent monitoring wells on the property (Refs. 21, p. 17; 37, p. 14). The sampling locations from the ESI are depicted on Figure 3 of Reference 21 (Ref. 21, Appendix A, p. A3).

Analytical results of the subsurface soil samples revealed the presence of elevated concentrations of PCE and detectable concentrations of TCE. The highest concentration of PCE (72  $\mu\text{g/kg}$ ) was detected south of the septic tank drain field (Ref. 21, p. 12, Appendix B, p. B2, Appendix C, pp. C11, C12). Analytical results of the shallow and deep ground water samples revealed the presence of elevated concentrations of cis-1,2-DCE; trans-1,2-DCE; PCE; TCE; and vinyl chloride. The highest concentrations of site-related hazardous substances detected in the shallow ground water samples are as follows: cis-1,2-DCE (3,500  $\mu\text{g/L}$ ); trans-1,2-DCE (14  $\mu\text{g/L}$ ); PCE (29  $\mu\text{g/L}$ ); TCE (180  $\mu\text{g/L}$ ); and vinyl chloride (950  $\mu\text{g/L}$ ) (Ref. 21, Appendix B, p. B3, Appendix C, p. C16, C18, C23). The highest concentrations of site-related hazardous substances detected in the deep ground water samples are as follows: cis-1,2-DCE (220  $\mu\text{g/L}$ ); trans-1,2-DCE (13  $\mu\text{g/L}$ ); PCE (88  $\mu\text{g/L}$ ); TCE (1,700  $\mu\text{g/L}$ ); and vinyl chloride (58  $\mu\text{g/L}$ ) (Ref. 21, Appendix B, p. B3, Appendix C, p. C22, C31). Of these elevated concentrations, trans-1,2-DCE was the only compound that was not detected above its respective MCL (Ref. 21, pp. 18, 19, Appendix C, pp. C16, C18, C22, C23, C31; 33, pp. 2, 4, 5). Ground water samples collected in the vicinity (northeast) of the septic tank contained the highest concentrations of hazardous substances (Ref. 21, pp. 18, 19, Appendix A, p. A3, Appendix B, p. B3).

## 2.2 SOURCE CHARACTERIZATION

### 2.2.1 SOURCE IDENTIFICATION

Number of source: 1

Name of source: Contaminated soil throughout property

Source Type: Contaminated soil

Description and Location of Source (with reference to a map of site):

Source No. 1 is an area of contaminated soil located throughout the property, including areas in the vicinity of the septic tank and drain field, former storage area at the back of the Flash Cleaners building, and in soils underlying the Flash Cleaners building. Surface and subsurface soil samples collected from Source No. 1 contained elevated concentrations of dry cleaning-related compounds including cis-1,2-DCE, trans-1,2-DCE, PCE, TCE, and vinyl chloride (Refs. 10, p. 10, Appendix A; 13, Attachment 3; 21, p. 11, 12, Appendix C; 22, Attachment 3) (also see Tables 1 and 2 and Figures 3 to 5 of this HRS documentation record). Soil located in Source No. 1 is suspected of becoming contaminated from spills that may have occurred in the former storage area located at the back of the Flash Cleaners building, as well as spills and discharges that occurred at other places on the Flash Cleaners property (Refs. 4, pp. 7, 8; 7, p. 2). Discharge to the septic tank drain field may have also impacted the surrounding soil. During a 1999 inspection, FDEP personnel observed a drum of hazardous waste stored on the ground in the storage area. At the time of the inspection, the facility operator indicated that during earlier years of operation, product and waste PCE, as well as separator and vacuum return wastewater were stored in drums in the storage area at the back of the Flash Cleaners building (Ref. 7, p. 2). However, manifests reviewed during the FDEP inspection did not support the storage of drummed wastewater in the Flash Cleaners storage area (Ref. 7, p. 2). Therefore, the wastewater may have been disposed of into the septic tank via plumbing or on the ground.

In September 2000, REP collected subsurface soil samples from two soil borings, one at the back entrance of the Flash Cleaners building immediately south of the septic tank (SB-E), and one south of the septic tank drain field in the western-most portion of the property (SB-W). The samples were collected at depths ranging from 3 to 7 feet bgs (Ref. 13, p. 2, Attachment 1) (see Figure 3 of this HRS documentation record). Sample SB-W3 (3 feet bgs) contained PCE at a concentration of 15.1 µg/kg (Ref. 13, p. 4, Attachment 3, pp. 5, 13). Sample SB-E5 (5 feet bgs) contained PCE and cis-1,2-DCE at concentrations of 293 µg/kg and 86 µg/kg, respectively (Ref. 13, p. 4, Attachment 3, pp. 10, 11, 13). Sample SB-E7 (7 feet bgs) contained PCE, TCE, and cis-1,2-DCE at concentrations of 704 µg/kg, 11.8 µg/kg, and 2,260 µg/kg, respectively (Ref. 13, p. 4, Attachment 3, pp. 7, 8, 13).

In November 2000, REP collected additional subsurface soil samples at depths ranging from 4 to 7 feet bgs from four locations on the property. The samples were collected at four locations: SB-North, SB-South, SB-East, and SB-West (Ref. 22, pp. 3, 7, Attachment 3, p. 25) (see Figure 3 of this HRS documentation record). Sample SB-North (4-5 feet bgs) contained PCE at 180 µg/kg, TCE at 52 µg/kg, and cis-1,2-DCE at 32 µg/kg (Ref. 22, Attachment 3, pp. 20, 25). Sample SB-North (6-7 feet bgs) contained PCE at 47 µg/kg, TCE at 13 µg/kg, and cis-1,2-DCE at 23 µg/kg (Ref. 22, Attachment 3, pp. 23, 25). Sample SB-South (6-7 feet bgs) contained PCE at a concentration of 33 µg/kg (Ref. 22, Attachment 3, pp. 11, 25). Sample SB-East (5-6 feet bgs) contained PCE at 36 µg/kg, cis-1,2-DCE at 1,600 µg/kg, and trans-1,2-DCE at 20 µg/kg (Ref. 22, Attachment 2, pp. 2, 25). Sample SB-East (6-7 feet bgs) contained PCE at 14 µg/kg, cis-1,2-DCE at 1,300 µg/kg, and trans-1,2-DCE at 10 µg/kg (Ref. 22, Attachment 3, pp. 5, 25). Sample SB-West (5-6 feet bgs) contained PCE at a concentration of 27 µg/kg (Ref. 22, Attachment 3, pp. 14, 25). Sample SB-West (6-7 feet bgs) contained PCE at 63 µg/kg and cis-1,2-DCE at 7.4 µg/kg (Ref. 22, Attachment 3, pp. 17, 25).



Soil samples used to characterize Source No. 1 were not located in the soil removal conducted as a result of the diesel fuel spill (Refs. 10, pp. 19, 20, 24; 17, pp. A2, A4; 21, Appendix A, p. A3, Appendix B, p. B2).

## 2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

### June 2003 Site Inspection

Surface and subsurface soil samples listed in Table 1 were collected by PBS&J during the June 2003 SI conducted on behalf of FDEP (Ref. 10, p. 1). The surface soil samples were collected from 0 to 2 feet bls and the subsurface soil samples were collected from 2 to 4 feet bls (Ref. 10, Table 2). The background surface (FC-SS-01) and subsurface soil (FC-SB-01) samples were collected from an adjacent property in an area located southwest of Source No. 1. The background soil samples are appropriate for establishing background levels because they were collected from an area that was not affected by past dry cleaning operations at Flash Cleaners (Ref. 10, p. 19). The Source No. 1 samples were collected from various locations throughout the property surrounding the Flash Cleaners septic tank (Ref. 10, pp. 19, 23). The background and source samples were collected from sandy soils; therefore, they are considered to be comparable (Ref. 34, p. 9, General Soil Map). The surface and subsurface soil samples were collected in accordance with the EPA Region 4, Science and Ecosystem Support Division (SED) Environmental Investigations Standard Operation Procedures and Quality Assurance Manual (EISOPQAM) (Refs. 10, p. 1; 40, Section 12). The background and source samples were analyzed under the EPA Contract Laboratory Program (CLP), using CLP Statement of Work (SOW) OLM04.3 (Refs. 10, Appendix A, pp. A1 to A3; 53). Contract-required quantitation limits (CRQL) are provided in Reference 39. Data validation was conducted by the EPA Region 4, SED Quality Assurance (QA) Office (Ref. 10, Appendix A, pp. A1 to A3). Analytical data sheets and the data qualifier report are contained in Appendix A of Reference 10. The locations of the surface and subsurface soil samples listed in Table 1 are provided on Figure 4 of this HRS documentation record. Form I data sheets from the laboratory are contained in Reference 53.

TABLE 1: Analytical Results for Source No. 1 – June 2003				
Sample ID	Hazardous Substance	Hazardous Substance Concentration	CRQL	References
<b>Background Samples</b>				
FC-SS-01	PCE	10 U µg/kg	10 µg/kg	10, Appendix A, pp. A4, A41; 39, p. 2; 53, p. 41
FC-SB-01	PCE	10 U µg/kg	10 µg/kg	10, Appendix A, pp. A8, A41; 39, p. 2; 53, p. 44
<b>Source Samples</b>				
FC-SS-02	PCE	20 µg/kg	10 µg/kg	10, Appendix A, pp. A5, A41; 39, p. 2; 53, p. 53
FC-SS-03	PCE	27 µg/kg	10 µg/kg	10, Appendix A, pp. A6, A41; 39, p. 2; 53, p. 56
FC-SB-02DU	PCE	18 µg/kg	10 µg/kg	10, Appendix A, pp. A10, A39; 39, p. 2; 53, p. 59

Notes:

CRQL Contract-required quantitation limit  
 DU Duplicate sample  
 FC Flash Cleaners  
 ID Identification number  
 µg/kg Microgram per kilogram  
 PCE Tetrachloroethylene  
 SB Subsurface soil sample  
 SS Surface soil sample  
 U Material not detected at or above reporting limit

## July 2005 Expanded Site Inspection

Subsurface soil samples listed in Table 2 were collected by Weston during the July 2005 ESI conducted on behalf of EPA Region 4 (Refs. 21, pp. 1, 2; 37; 38). The subsurface soil samples were collected from 2 to 3 feet bls (Ref. 38, p. 6). The background subsurface soil sample (FCS-01-SB) was collected upgradient and northwest of Flash Cleaners from an adjacent property. The Source No. 1 samples FCS-02-SB and FCS-03-SB were collected from two locations on the property. Subsurface soil sample FCS-02-SB was collected in the western portion of the Flash Cleaners property, south of the septic tank drain field, and subsurface soil sample FCS-03-SB was collected on the northern side of the Flash Cleaners building, northeast of the septic tank (Refs. 21, pp. 9, 10, Appendix A, p. A3; 37, p. 15). All samples were collected from sandy soils at similar depths; therefore, they are comparable (Refs. 34, p. 9, General Soil Map; 37, pp. 4, 5). The soil samples were collected in accordance with the EPA Region 4, SESD EISOPQAM, dated November 2001 (Refs. 21, p. 7; 38, p. 6; 40, Section 12). The samples were analyzed under the EPA CLP, using CLP SOW OLM04.3 (Refs. 21, p. 7, Appendix C, pp. C50 to C55; 54; 74). CRQLs are provided in Reference 39. Data validation was conducted by the EPA Region 4, SESD. Analytical data sheets and the data qualifier report are contained in Appendix C of Reference 21. Form I data sheets from the laboratory are contained in Reference 54. The locations of the subsurface soil samples listed in Table 2 are provided on Figure 5 of this HRS documentation record.

<b>TABLE 2: Analytical Results for Source No. 1 – July 2005</b>				
<b>Sample ID</b>	<b>Hazardous Substance</b>	<b>Hazardous Substance Concentration</b>	<b>Adjusted CRQL</b>	<b>References</b>
<b>Background Sample</b>				
FCS-01-SB	Tetrachloroethene	12 U µg/kg	12 µg/kg	21, Appendix C, pp. C10, C35; 39, p. 2; 54, p. 89; 74
<b>Source Samples</b>				
FCS-02-SB	Tetrachloroethene	72 µg/kg	11 µg/kg	21, Appendix C, pp. C11, C35; 39, p. 2; 54, p. 92; 74
FCS-03-SB	Tetrachloroethene	62 µg/kg	11 µg/kg	21, Appendix C, pp. C12, C35; 39, p. 2; 54, p. 95; 74

Notes:

CRQL Contract-required quantitation limit

FCS Flash Cleaners Site

ID Identification number

µg/kg Microgram per kilogram

SB Subsurface soil sample

U Material not detected at or above reporting limit

Adjusted CRQL = CLP CRQL for the analyte with any dilution factors, volume or weight adjustments, and solids ratio for the analysis taken into account

For low level soil samples, adjusted CRQL = CLP CRQL \* [(Contract Sample Weight \* Dilution Factor) / (Sample Weight \* Solids Ratio)]

### 2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Soil samples collected from Source No. 1 contain elevated concentrations of organic hazardous substances (Refs. 10, Appendix A; 21, Appendix C) (also see Tables 1 and 2 of this HRS documentation record). During the ESI, a liner was not observed during sampling activities (Ref. 38, p. 6). Therefore, a containment factor value of 10 was assigned for the ground water migration pathway (Ref. 1, Section 3.1.2.1).

<b>TABLE 3: Containment Factors for Source No. 1</b>		
<b>Containment Description</b>	<b>Containment Factor Value</b>	<b>References</b>
Gas release to air	NS	NA
Particulate release to air	NS	NA
Release to ground water: No liner	10	1, Section 3.1.2.1; 38, p. 6
Release via overland migration and/or flood: Evidence of hazardous substance migration from source area	NS	NA

Notes:

NA Not applicable  
NS Not scored



## **2.4.2.1 HAZARDOUS WASTE QUANTITY**

### **2.4.2.1.1 Hazardous Constituent Quantity**

The information available is not sufficient to evaluate Tier A, hazardous constituent quantity, as required by Reference 1, Section 2.4.2.1.1.

Hazardous Constituent Quantity Assigned Value: NS

### **2.4.2.1.2 Hazardous Wastestream Quantity**

The information available is not sufficient to evaluate Tier B, hazardous wastestream quantity, as required by Reference 1, Section 2.4.2.1.2.

Hazardous Wastestream Quantity Assigned Value: NS

### **2.4.2.1.3 Volume**

The information available is not sufficient to evaluate Tier C, hazardous volume quantity, as required by Reference 1, Section 2.4.2.1.3.

Volume Assigned Value: 0

### **2.4.2.1.4 Area**

A limited number of soil samples were collected from Source No. 1 (Refs. 10, p. 19; 21, Appendix A, p. A3). As a result, it is not known whether contamination in Source No. 1 is continuous. The area of Source No. 1 is undetermined, but greater than zero.

Sum (ft<sup>2</sup>): >0

Equation for Assigning Value (Table 2-5): Area (A)/34,000

Area Assigned Value: >0

### **2.4.2.1.5 Source Hazardous Waste Quantity Value**

The source hazardous waste quantity (HWQ) value for Source No. 1 is assigned a source HWQ value of greater than zero, but unknown (Ref. 1, Sec. 2.4.2.1.5).

Source HWQ Value: >0

### 2.2.1 SOURCE IDENTIFICATION

Number of source: 2

Name of source: Dry Cleaning Solvent Waste

Source Type: Other

Description and Location of Source (with reference to a map of the site):

Source No. 2 is an unknown quantity of dry cleaning solvent waste that was disposed of, or otherwise came to be located, in the septic tank, and may have been released either to the septic tank's drain field, or via a leak in the line leading from the septic tank to the drain field. During operations, Flash Cleaners used PCE as the dry cleaning solvent (Ref. 6, p. 1). During a 1999 FDEP inspection, the facility owners stated that all separator and vacuum return water were placed in drums for disposal. FDEP personnel indicated that waste manifests for January 1997 and December 1998 provided by the facility owners did not support their statements for that time period (Ref. 7, p. 2). It is not known how wastes were disposed of during this time period.

On February 28, 2001, REP, on behalf of Flash Cleaners, collected a sludge sample from the Flash Cleaners septic tank (Ref. 4, Attachment 2, p. 6). The sludge sample was analyzed for total halogenated VOCs using EPA SW-846 Method 8021B and for halogenated VOCs using the toxicity characteristics leaching procedure (TCLP) (EPA SW-846 Method 1311/8021) (Ref. 4, pp. 6, 7, Attachment 2). Total VOCs results indicated the presence of PCE (61,000,000 µg/kg) and cis-1,2-DCE (4,900,000 µg/kg); and TCLP VOCs results indicated the presence of PCE (270 mg/L) and TCE (30 mg/L). Concentrations of PCE and TCE were above the RCRA TCLP regulatory limits; therefore, the sludge removed from the septic tank was considered a hazardous waste that exhibited the characteristic of toxicity (Refs. 4, p. 7, Attachment 2; 41, p. 55). As a result, in April 2001, sludge in the septic tank was removed and the septic tank was pressure washed and inspected. No problems were found with the interior of the septic tank during the inspection of the septic tank after sludge removal (Ref. 4, p. 7). However, a plug was found in the line leading from the septic tank to the drain field, which apparently caused effluent to discharge near the septic tank inlet; the plug was repaired a few days after sludge removal (Ref. 4, pp. 7, 8). Ten drums of rinse water and sludge were generated when the septic tank was pumped out and pressure washed. The material generated was classified as RCRA hazardous waste and was disposed of accordingly (Ref. 4, p. 8, Attachment 3, pp. 1, 3). It is not known how much solvent waste was disposed of into the septic tank, nor is it known over what period of time such disposal activities occurred. It is also not known how much solvent waste was released from the septic tank either to the drain field or via the leak caused by the plugged line. The sample collected from the sludge contained in the Flash Cleaners septic tank was used to document hazardous substances contained in Source No. 2, Dry Cleaning Solvent Waste.

## 2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

The sludge sample listed in Table 4 was collected by REP, on behalf of Flash Cleaners, from sludge contained in the Flash Cleaners septic tank in February 2001. The sludge sample was analyzed for total halogenated VOCs using EPA SW-846 Method 8021B and for halogenated VOCs using TCLP (EPA SW-846 Method 1311/8021) (Ref. 4, pp. 6, 7, Attachment 2, p. A2-6). Analytical data sheets are contained in Attachment 2 of Reference 4. The location of the septic tank sludge sample is provided on Figure 3 of this HRS documentation record.

<b>TABLE 4: Analytical Results for Source No. 2 – February 2001</b>				
<b>Sample ID</b>	<b>Hazardous Substance</b>	<b>Hazardous Substance Concentration</b>	<b>Detection Limit</b>	<b>Reference</b>
<b>Total Halogenated VOC Results</b>				
Septic-01	Cis-1,2-dichloroethylene	4,900,000 µg/kg	1,500,000 µg/kg	4, Attachment 2, pp. A2-4, A2-6
Septic-01	Tetrachloroethylene	61,000,000 µg/kg	1,500,000 µg/kg	4, Attachment 2, pp. A2-4, A2-6
<b>Toxicity Characteristics Leaching Procedure – Halogenated VOC Results</b>				
Septic-01	Tetrachloroethylene	270,000 µg/L	10,000 µg/L	4, Attachment 2, pp. A2-2, A2-6
Septic-01	Trichloroethylene	30,000 µg/L	10,000 µg/L	4, Attachment 2, pp. A2-2, A2-6

Notes:

ID Identification number  
 µg/kg Microgram per kilogram  
 µg/L Microgram per liter  
 VOC Volatile organic compound

### 2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

The quantity of solvent waste generated and/or disposed of at the property is not known. The depth at which the septic tank is buried is not known. The Broward County Health Department does not have records for the septic system at Flash Cleaners (Ref. 61). Source No. 2 (unknown quantity of dry cleaning solvent waste) is not contained.

During the ESI, a liner was not observed during sampling activities (Ref. 38, p. 6). Liquid waste from the septic tank discharged to the drain field or elsewhere (due to the plugged line). Therefore, a containment factor value of 10 was assigned for the ground water migration pathway (Ref. 1, Section 3.1.2.1).

<b>TABLE 5: Containment Factors for Source No. 2</b>		
<b>Containment Description</b>	<b>Containment Factor Value</b>	<b>References</b>
Gas release to air	NS	NA
Particulate release to air	NS	NA
Release to ground water: No liner	10	1, Section 3.1.2.1; 38, p. 6
Release via overland migration and/or flood: Evidence of hazardous substance migration from source area	NS	NA

Notes:

NA Not applicable  
NS Not scored

### 2.4.2.1 HAZARDOUS WASTE QUANTITY

#### 2.4.2.1.1 Hazardous Constituent Quantity

The information available is not sufficient to evaluate Tier A, hazardous constituent quantity, as required by Reference 1, Section 2.4.2.1.1.

Hazardous Constituent Quantity Assigned Value: NS

#### 2.4.2.1.2 Hazardous Wastestream Quantity

The information available is not sufficient to evaluate Tier B, hazardous wastestream quantity, as required by Reference 1, Section 2.4.2.1.2. The hazardous wastestream quantity of Source No. 2 generated, disposed of in the septic tank, and released from the septic tank, from 1977 to 2001, is not known. Therefore, the hazardous wastestream quantity of Source No. 2 is undetermined, but greater than zero.

Hazardous Wastestream Quantity Assigned Value: > 0

#### 2.4.2.1.3 Volume

##### Description

The information available is not sufficient to evaluate Tier C, hazardous volume quantity, as required by Reference 1, Section 2.4.2.1.3.

Volume Assigned Value: 0

#### 2.4.2.1.4 Area

The source type for Source No. 2 is other. Area is not evaluated for source type other (Ref. 1, Table 2-5).

Sum (ft<sup>2</sup>): not evaluated

Equation for Assigning Value (Table 2-5): not evaluated

Area Assigned Value: not evaluated

#### 2.4.2.1.5 Source Hazardous Waste Quantity Value

The source HWQ value for Source No. 2 is assigned a source HWQ value of greater than zero, but unknown (Ref. 1, Sec. 2.4.2.1.5).

Source HWQ Value: >0

## SUMMARY OF SOURCE DESCRIPTIONS

<b>TABLE 6: Summary of Source Descriptions</b>						
<b>Source No.</b>	<b>Source Hazardous Waste Quantity Value</b>	<b>Source Hazardous Constituent Quantity Complete? (Yes/No)</b>	<b>Containment Factor Value by Pathway</b>			
			<b>Ground Water (Table 3-2)</b>	<b>Surface Water Overland/ Flood (Table 4-2)</b>	<b>Air</b>	
					<b>Gas (Table 6-3)</b>	<b>Particulate (Table 6-9)</b>
1	>0	No	10	NS	NS	NS
2	>0	No	10	NS	NS	NS

Notes:

> Greater than

NS Not scored

### 2.4.2.2 Hazardous Waste Quantity Factor Value: 10

#### Description of Other Possible Sources

The septic tank drain field, located in the western portion of the property, is another possible source at the Flash Cleaners property (Refs. 4, pp. 2, 4; 10, p. 18; 21, Appendix A, p. A2). An unknown volume of dry cleaning solvent waste was discharged from the Flash Cleaners septic tank to the drain field (Refs. 4, pp. 7, 8; 71). The dimensions of the septic tank drain field are not known (Ref. 61). Other possible sources of contamination in the area will be discussed in the Attribution Section of the HRS documentation record.



### 3.0 GROUND WATER MIGRATION PATHWAY

#### 3.0.1 GENERAL CONSIDERATIONS

##### Ground Water Migration Pathway Description

Flash Cleaners is located in Broward County in southeast Florida in the Atlantic Coastal Ridge (Ref. 24, p. 1). The area is underlain by a thick sequence of unconsolidated to semi-consolidated sedimentary rocks that range in age from Jurassic to Holocene (Ref. 23, p. B8). The sediments thicken seaward and in southern Florida, the thickness of the Coastal Plain sediments probably exceeds 25,000 feet; however, as of 1984, the maximum thickness penetrated there is slightly more than 18,600 feet (Ref. 23, p. B8). The facility is located in Pompano Beach and is situated at approximately 10 feet above mean sea level (Ref. 5). The property is underlain in descending stratigraphic order by the Pamlico Sand, Miami Oolite, Anastasia, Fort Thompson, and Tamiami Formations (Ref. 24, pp. 5, 7, 9).

The Pamlico Sand Formation is composed of quartz sand that ranges in color from white to black to red depending on the nature of the staining materials (Ref. 24, p. 9). The sand ranges from very fine to coarse with medium-sized grains predominating (Ref. 24, p. 9). The unit mantles large areas underlain by the Miami Oolite and Anastasia Formations and reaches a maximum thickness of approximately 40 feet in the vicinity of the property (Ref. 24, pp. 9, 24).

The Miami Oolite Formation is composed of massive cross-bedded oolitic limestone that is soft, and white to yellowish in color (Ref. 24, p. 9). The formation contains streaks or thin layers of calcite and is massive to cross bedded, and stratified (Ref. 24, p. 9). The formation is generally perforated with vertical solution holes (Ref. 24, p. 9). The Miami Oolite Formation reaches a maximum thickness of 40 feet thick in the vicinity of the property (Ref. 24, pp. 9, 23).

The Anastasia Formation is composed of marine sandy limestone, calcareous sandstone that is partially coquinoïd, and shelly sand (Ref. 24, p. 21). The Anastasia Formation represents the chief component of the Biscayne aquifer near the site (Refs. 24, p. 21). The Anastasia Formation reaches a maximum thickness of approximately 120 feet (Ref. 24, p. 9).

The Fort Thompson Formation is comprised of alternating marine, brackish-water and fresh-water marls, limestones, and sandstone (Ref. 24, p. 9). The Fort Thompson Formation is a succession of shelly marine and non-marine limestones and marls, including three distinct marine beds (Ref. 24, p. 12). The uppermost, the Coffee Mill Hammock member, is a shell marl (Ref. 24, p. 12). The marine marl members are separated by gray, shelly, marl beds, in part indurated to limestone, containing fresh water gastropods (Ref. 24, p. 12). The fresh water beds are pierced by vertical and lateral solution cavities formed by ground water percolation (Ref. 24, p. 12). Subsequent filling of the cavities by marine marls has produced a network of interconnected and isolated marine and freshwater marls and limestones (Ref. 24, p. 12). The Fort Thompson Formation reaches a maximum thickness of approximately 150 feet (Ref. 24, p. 9).

The Tamiami Formation is composed of cream, white, and greenish-gray clayey marl, silty and shelly sands, and shell marl locally hardened to limestone (Ref. 24, p. 9). The formation is divisible both lithologically and hydrologically into two units: a permeable limestone and sand unit, and a relatively impermeable clastic unit (Ref. 24, p. 10). In Broward County, the formation consists of relatively impermeable clastics (sand and marl) and comprises the upper part of the aquiclude that confines water in the underlying Floridan aquifer (Ref. 24, p. 10). The Tamiami Formation reaches a maximum thickness of approximately 100 feet (Ref. 24, p. 9).

## Hydrogeology Description

The Biscayne aquifer is composed of limestone, sandstone, and sand; however, in Broward County, the aquifer is primarily composed of sand (Ref. 25, p. 3). The Biscayne aquifer is an unconfined single hydrologic unit of permeable materials ranging in age from late Miocene through Pleistocene (Ref. 24, p. 4). The formations that comprise the aquifer include in descending stratigraphic order: the Pamlico Sand, Miami Oolite, Anastasia, Fort Thompson, and Tamiami Formations (Ref. 24, pp. 4, 5). The Pamlico Sand is the surficial unit in eastern Broward County (Ref. 69, p. 1). The Tamiami Formation forms the upper part of the aquiclude that separates the Biscayne from the underlying confined Floridan aquifer system (Ref. 24, p. 10). The Biscayne aquifer is recharged through the infiltration of rainfall (Refs. 24, p. 24; 25, p. 15; 69, p. 2). The oolitic limestone and sand that form the upper surface of the aquifer readily absorb the rainfall and move it rapidly to the water table (Ref. 25, p. 15).

Saltwater intrusion affects the entire coastal area of the Biscayne aquifer as saltwater extends inland from the coast and along tidal streams and canals (Ref. 25, pp. 22, 26). Saltwater moves inland and upward in response to low ground water levels and seaward and downward in response to high ground water levels (Ref. 25, p. 22). Ground water in the aquifer generally flows eastward toward the coast (Ref. 25, pp. 13, 33). The water table in the Biscayne aquifer is marked by the levels at which water stands in wells (Ref. 24, p. 25). The water table within the aquifer is highly variable and fluctuates in response to recharge (rainfall), and natural discharge (seepage into streams, canals, or the sea) and artificial discharge (pumping from wells) (Refs. 24, pp. 1, 26; 69, p. 3). The Biscayne aquifer is used by municipal water supply systems from south Palm Beach County southward (Refs. 25, p. 3; 69, p. 1). It is a highly permeable wedge-shaped unconfined aquifer that is approximately 350 feet thick in the vicinity of the property (Refs. 25, p. 3; 26, p. 55).

The Biscayne aquifer was designated as a sole-source aquifer by EPA (Refs. 25, p. 1; 70, pp. 173, 174). Because the aquifer is highly permeable and lies at shallow depths everywhere, it is readily susceptible to contamination (Ref. 69, p. 1). Pollutants enter the aquifer by direct infiltration from land surface or controlled canals, septic tank and other drain fields, drainage wells, and solid waste dumps (Ref. 25, p. 1). Most of the pollutants that enter the aquifer are concentrated in the upper 20 to 30 feet of the aquifer. The ultimate fate of pollutants in the aquifer is the ocean, although some may be adsorbed by the aquifer materials en route to the ocean, and some are diverted to pumping wells (Ref. 25, p. 1).

There are four monitoring wells on the property. MW-1 is located west of the building in the gravel area, and MW-2 is located east of the building in the parking lot (Ref. 13, Attachment 4). Both wells are installed at a depth of approximately 15 feet bls (Refs. 13, Attachment 4; 37, p. 14). MW-4S and MW-4I are located along the northern side of the Flash Cleaners building (Refs. 10, p. 8; 37, pp. 8, 9, 12 to 15). MW-4S is installed in the Biscayne aquifer at a depth of approximately 15 feet bls, and MW-4I is installed in the Biscayne aquifer at a depth of approximately 35 feet bls (Refs. 10, p. 8, Appendix B, pp. B4, B7; 37, pp. 8, 9, 12 to 15). All four wells are completed in sand and are less than 40 feet bls; these depths correspond to the Pamlico Sand Formation (Refs. 10, Appendix B, pp. B4, B7; 13, Attachment 4; 24, pp. 9, 24). The Pamlico Sand is the surficial unit of the Biscayne aquifer in eastern Broward County (Ref. 69, p. 1).

## SUMMARY OF AQUIFERS BEING EVALUATED

<b>TABLE 7: Summary of Aquifers Being Evaluated</b>					
<b>Aquifer Number</b>	<b>Aquifer Name</b>	<b>Is Aquifer Interconnected with Upper Aquifer within 2 Miles? (Yes/No/NA)</b>	<b>Is Aquifer Continuous within 4-mile TDL? (Yes/No)</b>	<b>Is Aquifer Karst? (Yes/No)</b>	<b>References</b>
1	Biscayne Aquifer	NA	Yes	No	23; 24; 25; 26; 69; 70

Notes:

NA Not applicable

TDL Target distance limit

### 3.1 LIKELIHOOD OF RELEASE

#### 3.1.1 OBSERVED RELEASE

Aquifer Being Evaluated: Biscayne Aquifer

##### Chemical Analysis

#### BACKGROUND SAMPLES

Table 8 presents a summary of background ground water samples collected from 2000 to 2005 on and in the immediate vicinity of the Flash Cleaners facility. The background ground water samples described in this section are used to demonstrate that the ground water contamination is localized at Flash Cleaners. Because Flash Cleaners and Web Auto World (formerly Cole Muffler) share a common wall, a ground water sample could not be collected between the two buildings (properties) (Refs. 10, p. 19; 21, Appendix A, p. A3; 43, pp. 8, 9).

In 2000, REP conducted a limited site assessment of the Flash Cleaners property on behalf of Flash Cleaners. During the assessment, REP installed two permanent monitoring wells and collected a ground water sample from each well. MW-1 was installed at the back entrance of the Flash Cleaners building immediately south of the septic tank, and MW-2 was installed east of the Flash Cleaners building in the parking lot (Ref. 13, pp. 2-3, Attachment 1). MW-2 was selected as the background sample because it was installed in the eastern portion of the Flash Cleaners property away from the Flash Cleaners septic tank and drain field and past waste disposal activities (Ref. 13, Attachment 1). The boring logs and well completion report are contained in Attachment 4 of Reference 13. The ground water sampling logs are contained in Attachment 5 of Reference 13. The samples were collected in accordance with Florida Rules and Regulations by or under the supervision of a registered professional geologist (Ref. 13, p. 7). The location of MW-2 is listed in Table 8 and depicted on Figure 3 of this HRS documentation record. The concentrations of hazardous substances detected in the 2000 background monitoring well are presented in Table 9.

In June 2003, PBS&J conducted a SI at the Flash Cleaners facility on the behalf of FDEP (Ref. 10, pp. 1, 8, Tables 2 and 4). Ground water samples were collected from temporary, and new and existing permanent monitoring wells completed at various depths in the Biscayne aquifer. The samples and their corresponding depths are provided in Table 8 (Ref. 10, Appendix B, pp. B1, B3, B4, B6, B7, B9, B10). Temporary monitoring wells MW-03S, MW-03I, and MW-03D, located at the southwestern corner of the Web Auto World property, were selected as background wells for this ground water sampling event because they were collected upgradient of operations at Flash Cleaners and Web Auto World. Web Auto World is located adjacent to the southern side of Flash Cleaners (Ref. 10, p. 19). The concentrations of hazardous substances detected in the 2003 background monitoring wells are presented in Table 10. MW-1S is located in immediately south of the Flash Cleaners septic tank; and the MW-04S, MW-04I, and MW-04D cluster, is located northeast of the Flash Cleaners septic tank (Ref. 10, p. 19). Newly installed permanent monitoring wells and temporary monitoring wells were constructed in accordance with the EPA Region 4 SESD EISOPQAM, dated November 2001 (Refs. 10, p. 1; 40, Section 6). The permanent and temporary monitoring wells were completed in the Biscayne aquifer at three depth intervals: shallow, about 15 feet bls; intermediate, about 35 feet bls; and deep, about 50 feet bls (Refs. 10, p. 8, Appendix B; 26, p. 55). Ground water sampling activities were conducted in accordance with the EPA Region 4 SESD EISOPQAM, dated November 2001 (Refs. 1, p. 1; 40, Section 7). Ground water sample data sheets are contained in Appendix B of Reference 10. The locations of the ground water samples are listed in Table 8 and depicted on Figure 4 of this HRS documentation record.

In July 2005, Weston conducted an ESI at the Flash Cleaners facility on the behalf of EPA Region 4 (Refs. 21, pp. 1, 2, 7; 37; 38). During the ESI, ground water samples were collected from temporary and existing permanent monitoring wells completed at various depths in the Biscayne aquifer. The ground water samples and their corresponding depths are provided in Table 8 (Refs. 21, pp. 13, 14, Appendix B,

p. B-4; 37, p. 14). Background shallow ground water sample FCS-01-GW was collected from a temporary monitoring well installed using direct push technology on an adjacent property located northwest of Flash Cleaners (Refs. 21, p. 17, Appendix A, p. A-3; 37, p. 4). Background deep ground water sample FCS-09-GW (and its duplicate sample [FCS-12-GW]) was collected from a temporary monitoring well installed using direct push technology in the eastern portion of the Flash Cleaners property (Refs. 21, p. 18, Appendix A, p. A-3; 37, p. 14; 38, p. 4). Ground water sample FCS-01-GW was selected as a background sample because it was collected upgradient of Flash Cleaners, from an area that was not impacted by site operations (Ref. 21, p. 13, Appendix A, p. A3). Ground water samples FCS-09-GW/FCS-12-GW were selected as background samples because they were collected from a well installed in the eastern portion of the Flash Cleaners property away from the Flash Cleaners septic tank and drain field and historical waste disposal activities (Refs. 21, pp. 13, 18, Appendix A, p. A3; 37, p. 15). Ground water sample FCS-08-GW was collected from existing permanent well (MW-2) located in the eastern portion of the Flash Cleaners property away from site operations (Refs. 21, pp. 13, 18, Appendix A, p. A3; 37, p. 15). Ground water sample FCS-10-GW was selected as a background sample because it was collected from a temporary monitoring well installed south and upgradient of Flash Cleaners (Refs. 21, pp. 13, 18, Appendix A, p. A3; 37, p. 15). Temporary wells were installed and all ground water sampling activities were conducted in accordance with EPA Region 4 SESD EISOPQAM, dated November 2001 (Refs. 21, p. 7; 38, p. 6; 40, Sections 6 and 7). The locations of the ground water samples are listed in Table 8 and depicted on Figure 5 of this HRS documentation record. The concentrations of hazardous substances detected in the 2005 background wells are summarized in Table 11.

TABLE 8: Background Ground Water Samples					
Sample ID	Total Depth (feet bls)	Depth to Water (feet bls)	Date Sampled	Location	References
September 2000 REP Sampling Event					
MW-2	14.86	6.27	09/18/00	Parking area in eastern portion of the Flash Cleaners property	13, Attachment 1, Attachment 5, p. 2
June 2003 PBS&J SI					
FC-MW-03S	~15	5	06/10/03	Off of the Flash Cleaners property, corner of NE 41 <sup>st</sup> Street and access road, southwest of Web Auto World	10, pp. 16, 19, Appendix A, p. A40, Appendix B, p. B3; 37, p. 15
FC-MW-03I	35	5	06/10/03		10, pp. 16, 19, Appendix A, p. A40, Appendix B, p. B6; 37, p. 15
FC-MW-03D	50	5	06/10/03		10, pp. 16, 19, Appendix A, p. A40, Appendix B, p. B9; 37, p. 15
July 2005 Weston ESI					
FCS-01-GW	15	4.26	07/12/05	On nearby property northwest of Flash Cleaners, between the access road and vacant building	21, Appendix B, p. B4, Appendix C, p. C36; 37, pp. 3, 4, 14, 15

<b>TABLE 8: Background Ground Water Samples</b>					
<b>Sample ID</b>	<b>Total Depth (feet bls)</b>	<b>Depth to Water (feet bls)</b>	<b>Date Sampled</b>	<b>Location</b>	<b>References</b>
FCS-08-GW	~15	NR	07/13/05	From MW-2 in parking area in eastern portion of the Flash Cleaners property	21, Appendix B, p. B4, Appendix C, p. C37; 37, pp. 11, 14, 15
FCS-09-GW	43.5	5.45	07/13/05	Parking area in eastern portion of the Flash Cleaners property near MW-2	21, Appendix B, p. B4, Appendix C, p. C37; 37, pp. 14, 15; 38, p. 4
FCS-10-GW	~15	5.02	07/12/05	Off of the Flash Cleaners property, near the corner of NE 41 <sup>st</sup> Street and access road, south of Web Auto World	21, Appendix B, p. B4, Appendix C, p. C36; 37, pp. 14, 15; 38, p. 2
FCS-12-GW	43.5	5.45	07/13/05	Parking area in eastern portion of the Flash Cleaners property near MW-2	21, Appendix B, p. B4, Appendix C, p. C37; 37, pp. 14, 15; 38, p. 4

Notes:

~ About  
 bls Below land surface  
 D Deep well  
 ESI Expanded Site Inspection  
 FC Flash Cleaners  
 FCS Flash Cleaners Site  
 GW Ground water sample  
 I Intermediate well  
 ID Identification number  
 MW Monitoring well  
 NR Not recorded  
 S Shallow well



## BACKGROUND CONCENTRATIONS

### September 2000 Background Sample Concentrations

Ground water samples listed in Table 9 were collected in September 2000 by REP and analyzed by Envirodyne, Inc., in accordance with the FDEP approved Comprehensive Quality Assurance Plan No. 890041 (Ref. 13, p. 3). The samples were analyzed for purgeable halocarbons using EPA Method 601 (Ref. 13, Attachment 6, pp. 2-3). Analytical data sheets are contained in Attachment 6 of Reference 13.

TABLE 9: Analytical Results for 2000 Background Ground Water Samples				
Sample ID	Hazardous Substance	Concentration	Detection Limit	Reference
September 2000 REP Sampling Event				
MW-2	cis-1,2-DCE	BDL (<1 µg/L)	1.0 µg/L	13, Attachment 6, p. 3
MW-2	trans-1,2-DCE	BDL (<1 µg/L)	1.0 µg/L	13, Attachment 6, p. 3

Notes:

BDL Below detection limit

DCE Dichloroethylene

ID Identification number

µg/L Microgram per liter

MW Monitoring well

### June 2003 Background Sample Concentrations

The ground water samples listed in Table 10 were collected by PBS&J during the June 2003 SI (Ref. 10, pp. 19, 23). The ground water samples were analyzed by an EPA CLP laboratory (Ref. 10, p. 1, Appendix A). CRQLs are provided in Reference 39. The methods of analyses were CLP SOWs OLM04.3 and OLC03.2 (Refs. 10, Appendix A, pp. A2, A3; 53). Data validation was conducted by the EPA Region 4, SESD QA Office (Ref. 10, Appendix A, pp. A1, A2, A3). Analytical data sheets and the data qualifier report are contained in Appendix A of Reference 10. Form I data sheets from the laboratory are contained in Reference 53.

TABLE 10: Analytical Results for 2003 Background Ground Water Samples				
Sample ID	Hazardous Substance	Concentration	CRQL	References
June 2003 PBS&J SI				
FC-MW-03S	cis-1,2-DCE	0.5 U µg/L	0.5 µg/L	10, Appendix A, p. A16; 39, p. 1; 53, p. 73
FC-MW-03S	trans-1,2-DCE	0.5 U µg/L	0.5 µg/L	10, Appendix A, p. A16; 39, p. 1; 53, p. 73
FC-MW-03S	PCE	0.5 U µg/L	0.5 µg/L	10, Appendix A, p. A16; 39, p. 2; 53, p. 74
FC-MW-03S	TCE	0.5 U µg/L	0.5 µg/L	10, Appendix A, p. A16; 39, p. 1; 53, p. 74

<b>TABLE 10: Analytical Results for 2003 Background Ground Water Samples</b>				
<b>Sample ID</b>	<b>Hazardous Substance</b>	<b>Concentration</b>	<b>CRQL</b>	<b>References</b>
FC-MW-03S	Vinyl chloride	0.5 U µg/L	0.5 µg/L	10, Appendix A, p. A16; 39, p. 1; 53, p. 73
FC-MW-03I	cis-1,2-DCE	0.5 U µg/L	0.5 µg/L	10, Appendix A, p. A17; 39, p. 1; 53, p. 71
FC-MW-03D	cis-1,2-DCE	0.5 U µg/L	0.5 µg/L	10, Appendix A, p. A18; 39, p. 1; 53, p. 69
FC-MW-03D	PCE	0.5 U µg/L	0.5 µg/L	10, Appendix A, p. A18; 39, p. 2; 53, p. 70
FC-MW-03D	TCE	0.5 U µg/L	0.5 µg/L	10, Appendix A, p. A18; 39, p. 1; 53, p. 70

Notes:

CRQL Contract required quantitation limit

D Deep well

DCE Dichloroethylene

FC Flash Cleaners

I Intermediate well

ID Identification number

µg/L Microgram per liter

MW Monitoring well

PCE Tetrachloroethylene

S Shallow well

TCE Trichloroethylene

U Analyte was not detected at or above the reporting limit

### July 2005 Background Sample Concentrations

The ground water samples listed in Table 11 were collected by Weston during the July 2005 ESI and analyzed by an EPA CLP laboratory (Ref. 21, pp. 1, 2, 7, 13-14, Appendix C). CRQLs are provided in Reference 39. The ground water samples were analyzed using the EPA CLP SOW OLM04.3 (Refs. 21, Appendix C, pp. C50 to C55; 54; 74). Data validation was conducted (Ref. 21, Appendix C, pp. C50 to C55). Analytical data sheets and the data qualifier report are contained in Appendix C of Reference 21. Analytical results for background ground water sample FCS-12-GW (duplicate of FCS-09-GW) are not provided because they are the same as the results for FCS-09-GW (Ref. 21, Appendix C, pp. C27, C32). Form I data sheets from the laboratory are contained in Reference 54.

<b>TABLE 11: Analytical Results for 2005 Background Ground Water Samples</b>				
<b>Sample ID</b>	<b>Hazardous Substance</b>	<b>Concentration</b>	<b>Detection Limit</b>	<b>References</b>
<b>July 2005 Weston ESI</b>				
FCS-01-GW	cis-1,2-DCE	10 U µg/L	10 µg/L	21, Appendix C, p. C15; 54, p. 12; 74

<b>TABLE 11: Analytical Results for 2005 Background Ground Water Samples</b>				
<b>Sample ID</b>	<b>Hazardous Substance</b>	<b>Concentration</b>	<b>Detection Limit</b>	<b>References</b>
FCS-01-GW	trans-1,2-DCE	10 U µg/L	10 µg/L	21, Appendix C, p. C15; 54, p. 12; 74
FCS-01-GW	PCE	10 U µg/L	10 µg/L	21, Appendix C, p. C15; 54, p. 13; 74
FCS-01-GW	TCE	10 U µg/L	10 µg/L	21, Appendix C, p. C15; 54, p. 13; 74
FCS-01-GW	Vinyl chloride	10 U µg/L	10 µg/L	21, Appendix C, p. C15; 54, p. 12; 74
FCS-08-GW	cis-1,2-DCE	10 U µg/L	10 µg/L	21, Appendix C, p. C25; 54, p. 39; 74
FCS-08-GW	trans-1,2-DCE	10 U µg/L	10 µg/L	21, Appendix C, p. C25; 54, p. 39; 74
FCS-08-GW	PCE	10 U µg/L	10 µg/L	21, Appendix C, p. C25; 54, p. 40; 74
FCS-08-GW	TCE	10 U µg/L	10 µg/L	21, Appendix C, p. C25; 54, p. 40; 74
FCS-08-GW	Vinyl chloride	10 U µg/L	10 µg/L	21, Appendix C, p. C25; 54, p. 39; 74
FCS-09-GW	cis-1,2-DCE	10 U µg/L	10 µg/L	21, Appendix C, p. C27; 54, p. 42; 74
FCS-09-GW	trans-1,2-DCE	10 U µg/L	10 µg/L	21, Appendix C, p. C27; 54, p. 42; 74
FCS-09-GW	PCE	10 U µg/L	10 µg/L	21, Appendix C, p. C27; 54, p. 43; 74
FCS-09-GW	TCE	10 U µg/L	10 µg/L	21, Appendix C, p. C27; 54, p. 43; 74
FCS-09-GW	Vinyl chloride	10 U µg/L	10 µg/L	21, Appendix C, p. C27; 54, p. 42; 74
FCS-10-GW	cis-1,2-DCE	10 U µg/L	10 µg/L	21, Appendix C, p. C29; 54, p. 45; 74
FCS-10-GW	trans-1,2-DCE	10 U µg/L	10 µg/L	21, Appendix C, p. C29; 54, p. 45; 74
FCS-10-GW	PCE	10 U µg/L	10 µg/L	21, Appendix C, p. C29; 54, p. 46; 74
FCS-10-GW	TCE	10 U µg/L	10 µg/L	21, Appendix C, p. C29; 54, p. 46; 74
FCS-10-GW	Vinyl chloride	10 U µg/L	10 µg/L	21, Appendix C, p. C29; 54, p. 45; 74

Notes:

DCE	Dichloroethylene
ESI	Expanded Site Inspection
FCS	Flash Cleaners Site
GW	Ground water sample
ID	Identification number
µg/L	Microgram per liter
PCE	Tetrachloroethylene
TCE	Trichloroethylene
U	Analyte was not detected at or above the reporting limit

## CONTAMINATED SAMPLES

### September 2000 Contaminated Sample Descriptions

The ground water sample listed in Table 12 was collected by REP on behalf of the Flash Cleaners facility. The ground water sample was collected from a permanent monitoring well installed during the limited site assessment (Ref. 13, p. 2, Attachment 1). MW-1 was installed at the back entrance of the Flash Cleaners building immediately south of the septic tank (Ref. 13, p. 2, Attachment 1). The boring log and well completion report are contained in Attachment 4 of Reference 13. The ground water sampling log is contained in Attachment 5 of Reference 13. The ground water sample collected from MW-1 was collected in accordance with Florida Rules and Regulations by or under the supervision of a registered professional geologist (Ref. 13, p. 7). The location of the ground water sample listed in Table 12 is depicted on Figure 3 of this HRS documentation record. The location and construction details for the background ground water samples are provided in Table 8 of this HRS documentation record.

TABLE 12: Ground Water Sample – September 2000					
Sample ID	Total Depth (feet bls)	Depth to Water (feet bls)	Date Sampled	Location	Reference
MW-1	14.90	6.94	09/18/00	In western portion of the Flash Cleaners property at the back door of the Flash Cleaners building south of the septic tank	13, p. 2, Attachment 1, Attachment 5, p. 1

Notes:

bls     Below land surface  
ID     Identification number  
MW     Monitoring well

### September 2000 Contaminated Sample Concentrations

The ground water sample listed in Table 13 was collected in September 2000 by REP and analyzed by Envirodyne, Inc., in accordance with the FDEP approved Comprehensive Quality Assurance Plan No. 890041 (Ref. 13, p. 3). The sample was analyzed for purgeable halocarbons using EPA Method 601 (Ref. 13, Attachment 6, p. 2). Analytical data sheets are contained in Attachment 6 of Reference 13. Background concentrations are provided in Table 9 of this HRS documentation record.

TABLE 13: Analytical Results for Ground Water Samples – September 2000				
Sample ID	Hazardous Substance	Concentration	Detection Limit	Reference
MW-1	cis-1,2-DCE	2,700 µg/L	100 µg/L	13, Attachment 6, p. 2
MW-1	Trans-1,2-DCE	6.2 µg/L	1.0 µg/L	13, Attachment 6, p. 2

Notes:

DCE     Dichloroethylene  
ID     Identification number

µg/L    Microgram per liter  
 MW    Monitoring well

### June 2003 Contaminated Sample Descriptions

Ground water samples listed in Table 14 were collected by PBS&J during the June 2003 SI conducted on behalf of FDEP (Ref. 10, pp. 1, 8, Tables 2 and 4). Ground water samples were collected from temporary, and newly installed and existing permanent monitoring wells completed at various depths in the Biscayne aquifer. The samples and their corresponding depths are provided in Table 14 (Ref. 10, Appendix B, pp. B1, B4, B7, B10). Newly installed permanent monitoring wells and temporary monitoring wells were constructed and sampled in accordance with the EPA Region 4 SESD EISOPQAM, dated November 2001 (Refs. 10, p. 1; 40, Sections 6 and 7). The permanent and temporary monitoring wells were completed in the Biscayne aquifer at three depth intervals: shallow, about 15 feet bls; intermediate, about 35 feet bls; and deep, about 50 feet bls (Ref. 10, p. 8, Appendix B). Ground water sample data sheets are contained in Appendix B of Reference 10. The locations of the ground water samples listed in Table 14 are depicted on Figure 4 of this HRS documentation record. The locations and construction details for the background samples are provided in Table 8.

<b>TABLE 14: Ground Water Samples – June 2003</b>					
<b>Sample ID</b>	<b>Total Depth (feet bls)</b>	<b>Depth to Water (feet bls)</b>	<b>Date Sampled</b>	<b>Location</b>	<b>Reference</b>
FC-MW-01S	14.88	6.58	06/10/03	From existing well MW-1 located in the western portion of the Flash Cleaners property at the back door of the Flash Cleaners building and south of the septic tank	10, pp. 19, 23, Appendix A, p. A41, Appendix B, p. B1
FC-MW-04S	14.40	7.41	06/10/03	On the Flash Cleaners property, shallow well on northern side of Flash Cleaners building near septic tank	10, pp. 19, 23, Appendix A, p. A41, Appendix B, p. B4
FC-MW-04SD (duplicate of above)	14.40	7.41	06/10/03	On the Flash Cleaners property, shallow well on northern side of Flash Cleaners building near septic tank	10, pp. 19, 23, Appendix A, p. A41, Appendix B, p. B4

TABLE 14: Ground Water Samples – June 2003					
Sample ID	Total Depth (feet bls)	Depth to Water (feet bls)	Date Sampled	Location	Reference
FC-MW-04I	34.55	5.86	06/10/03	On the Flash Cleaners property, intermediate well on northern side of Flash Cleaners building near septic tank	10, pp. 19, 23, Appendix A, p. A41, Appendix B, p. B7
FC-MW-04D	50	5	06/9/03	On the Flash Cleaners property, deep well on northern side of Flash Cleaners building near septic tank	10, pp. 19, 23, Appendix A, p. A41, Appendix B, p. B10

Notes:

bls Below land surface  
D Deep well  
FC Flash Cleaners  
I Intermediate well  
ID Identification number  
MW Monitoring well  
S Shallow well

**June 2003 Contaminated Sample Concentrations**

The ground water samples listed in Table 15 were collected by PBS&J during the June 2003 SI (Ref. 10, pp. 21, 23). The ground water samples were analyzed by an EPA CLP laboratory (Ref. 10, p. 1, Appendix A). CRQLs are provided in Reference 39. The methods of analyses were CLP SOWs OLM04.3 and OLC03.2 (Refs. 10, Appendix A, pp. A2, A3; 53). Data validation was conducted by the EPA Region 4, SESD QA Office (Ref. 10, Appendix A, pp. A1, A2, A3). Analytical data sheets and the data qualifier report are contained in Appendix A of Reference 10. Form I data sheets from the laboratory are contained in Reference 53. Background concentrations are provided in Table 10 of this HRS documentation record.

TABLE 15: Analytical Results for Ground Water Samples – June 2003				
Sample ID	Hazardous Substance	Concentration	Adjusted CRQL	References
FC-MW-01S	cis-1,2-DCE	500 µg/L	100 µg/L	10, Appendix A, p. A13; 39, p. 1; 53, p. 15
FC-MW-01S	Vinyl chloride	280 µg/L	100 µg/L	10, Appendix A, p. A13; 39, p. 1; 53, p. 15
FC-MW-04S	cis-1,2-DCE	5,600 µg/L	1,000 µg/L	10, Appendix A, p. A19; 39, p. 1; 53, p. 27



<b>TABLE 15: Analytical Results for Ground Water Samples – June 2003</b>				
<b>Sample ID</b>	<b>Hazardous Substance</b>	<b>Concentration</b>	<b>Adjusted CRQL</b>	<b>References</b>
FC-MW-04S	trans-1,2-DCE	31 µg/L	10 µg/L	10, Appendix A, p. A19; 39, p. 1; 53, p. 24
FC-MW-04S	PCE	12 µg/L	10 µg/L	10, Appendix A, p. A19; 39, p. 2; 53, p. 25
FC-MW-04S	TCE	34 µg/L	10 µg/L	10, Appendix A, p. A19; 39, p. 1; 53, p. 25
FC-MW-04S	Vinyl chloride	6,800 µg/L	1,000 µg/L	10, Appendix A, p. A19; 39, p. 1; 53, p. 27
FC-MW-04SD	cis-1,2-DCE	5,400 µg/L	1,000 µg/L	10, Appendix A, p. A21; 39, p. 1; 53, p. 33
FC-MW-04SD	trans-1,2-DCE	29 µg/L	10 µg/L	10, Appendix A, p. A21; 39, p. 1; 53, p. 30
FC-MW-04SD	PCE	13 µg/L	10 µg/L	10, Appendix A, p. A21; 39, p. 2; 53, p. 31
FC-MW-04SD	TCE	33 µg/L	10 µg/L	10, Appendix A, p. A21; 39, p. 1; 53, p. 31
FC-MW-04SD	Vinyl chloride	6,600 µg/L	1,000 µg/L	10, Appendix A, p. A21; 39, p. 1; 53, p. 33
FC-MW-04I	Cis-1,2-DCE	74 µg/L	10 µg/L	10, Appendix A, p. A23; 39, p. 1; 53, p. 21
FC-MW-04D	Cis-1,2-DCE	27 µg/L	10 µg/L	10, Appendix A, p. A24; 39, p. 1; 53, p. 18
FC-MW-04D	PCE	11 µg/L	10 µg/L	10, Appendix A, p. A24; 39, p. 2; 53, p. 19
FC-MW-04D	TCE	18 µg/L	10 µg/L	10, Appendix A, p. A24; 39, p. 1; 53, p. 19

Notes:

bls     Below land surface  
 CRQL   Contract-required quantitation limit  
 D       Deep well  
 DCE    Dichloroethylene  
 FC      Flash Cleaners  
 I        Intermediate well  
 ID      Identification number  
 µg/L    Microgram per liter  
 MW     Monitoring well  
 PCE     Tetrachloroethylene  
 S        Shallow well  
 TCE     Trichloroethylene  
 U        Analyte was not detected at or above the reporting limit

Adjusted CRQL = CLP CRQL for the analyte with any dilution factors and volume or weight adjustments for the analysis taken into account. For aqueous samples, adjusted CRQL = CLP CRQL \* (Contract Sample Volume / Volume Analyzed) \* Dilution Factor

## July 2005 Contaminated Sample Descriptions

Ground water samples listed in Table 16 were collected by Weston during the July 2005 ESI conducted on behalf of EPA Region 4 (Refs. 21, pp. 1, 2, 7, 13-14; 37; 38). Ground water samples were collected from temporary and existing permanent monitoring wells completed at various depths in the Biscayne aquifer (Ref. 37, p. 14; also see Sec. 3.0.1 of this HRS documentation record). The ground water samples and their corresponding depths are provided in Table 16 (Refs. 21, pp. 13, 14, Appendix B, p. B4; 37, p. 14). Temporary wells installed and all ground water sampling activities were conducted in accordance with EPA Region 4 SESD EISOPQAM, dated November 2001 (Refs. 21, p. 7; 38, p. 6; 40, Sections 6 and 7). The locations of the ground water samples listed in Table 16 are depicted on Figure 5 of this HRS documentation record. The locations and construction details for the background ground water samples are provided in Table 8 of this HRS documentation record.

**TABLE 16: Ground Water Samples – July 2005**

<b>Sample ID</b>	<b>Total Depth (feet bls)</b>	<b>Depth to Water (feet bls)</b>	<b>Date Sampled</b>	<b>Location</b>	<b>References</b>
FCS-02-GW	14.28	3.31	07/13/05	Western portion of the Flash Cleaners property south of the septic tank drain field and west of permanent well MW-1	21, Appendix B, p. B4, Appendix C, p. C37; 37, pp. 14-16
FCS-03-GW	15	5.91	07/12/05	On the Flash Cleaners property, northwestern corner of Flash Cleaners building northeast of septic tank	21, Appendix B, p. B4, Appendix C, p. C36; 37, pp. 5, 14, 15
FCS-06-GW	42.75	7.0	07/13/05	Off of the Flash Cleaners property, southeastern corner of former Deerfield Suzuki building, adjacent to northeastern corner of Flash Cleaners property boundary	21, Appendix B, p. B4, Appendix C, p. C37; 37, pp. 14, 15; 38, pp. 4, 5

TABLE 16: Ground Water Samples – July 2005					
Sample ID	Total Depth (feet bls)	Depth to Water (feet bls)	Date Sampled	Location	References
FCS-07-GW	15	NR	07/13/05	From existing MW-1 located in the western portion of the Flash Cleaners property at the back door of the Flash Cleaners building and south of the septic tank	21, Appendix B, p. B4, Appendix C, p. C37; 37, pp. 8, 14, 15
FCS-11-GW	34.5	NR	07/13/05	On the Flash Cleaners property, existing monitoring well MW-04I located on northern side of Flash Cleaners building near septic tank	21, Appendix B, p. B4, Appendix C, p. C37; 37, pp. 9, 10, 14, 15

Notes:

bls     Below land surface  
FCS     Flash Cleaners Site  
GW     Ground water sample  
I        Intermediate well  
ID      Identification number  
MW     Monitoring well  
NR      Not recorded

### 2005 Contaminated Sample Concentrations

The ground water samples listed in Table 17 were collected by Weston during the July 2005 ESI and analyzed by an EPA CLP laboratory (Ref. 21, pp. 1, 9, Appendix C). CRQLs are provided in Reference 39. The ground water samples were analyzed using the EPA CLP SOW OLM04.3 (Refs. 21, Appendix C, pp. C50 to C55; 54; 74). Data validation was conducted by the EPA Region 4 SEDS (Ref. 21, Appendix C, pp. C50 to C55). Analytical data sheets and the data qualifier report are contained in Appendix C of Reference 21. Analytical results for background ground water sample FCS-12-GW (duplicate of FCS-09-GW) are not provided because they are the same as the results for FCS-09-GW (Ref. 21, Appendix C, pp. C27, C32). Form I data sheets from the laboratory are contained in Reference 54. Background concentrations are provided in Table 11 of this HRS documentation record.

<b>TABLE 17: Analytical Results for Ground Water Samples – July 2005</b>				
<b>Sample ID</b>	<b>Hazardous Substance</b>	<b>Concentration</b>	<b>Adjusted CRQL</b>	<b>References</b>
FCS-02-GW	PCE	29 µg/L	10 µg/L	21, Appendix C, p. C16; 39, p. 2; 54, p. 16; 74
FCS-03-GW	cis-1,2-DCE	3,500 µg/L	200 µg/L	21, Appendix C, p. C18; 39, p. 1; 54, p. 21; 74
FCS-03-GW	trans-1,2-DCE	14 µg/L	10 µg/L	21, Appendix C, p. C18; 39, p. 1; 54, p. 18; 74
FCS-03-GW	TCE	180 µg/L	10 µg/L	21, Appendix C, p. C18; 39, p. 1; 54, p. 19; 74
FCS-03-GW	Vinyl chloride	950 µg/L	200 µg/L	21, Appendix C, p. C18; 39, p. 1; 54, p. 21; 74
FCS-06-GW	cis-1,2-DCE	220 µg/L	100 µg/L	21, Appendix C, p. C22; 39, p. 1; 54, p. 33; 74
FCS-06-GW	trans-1,2-DCE	13 µg/L	10 µg/L	21, Appendix C, p. C22; 39, p. 1; 54, p. 30; 74
FCS-06-GW	PCE	88 µg/L	10 µg/L	21, Appendix C, p. C22; 39, p. 2; 54, p. 31; 74
FCS-06-GW	TCE	1,700 µg/L	100 µg/L	21, Appendix C, p. C22; 39, p. 1; 54, p. 34; 74
FCS-06-GW	Vinyl chloride	10 µg/L	10 µg/L	21, Appendix C, p. C22; 39, p. 1; 54, p. 30; 74
FCS-07-GW	Cis-1,2-DCE	28 µg/L	10 µg/L	21, Appendix C, p. C23; 39, p. 1; 54, p. 36; 74
FCS-07-GW	Vinyl chloride	130 µg/L	10 µg/L	21, Appendix C, p. C23; 39, p. 1; 54, p. 36; 74
FCS-11-GW	Cis-1,2-DCE	150 µg/L	20 µg/L	21, Appendix C, p. C31; 39, p. 1; 54, p. 51; 74
FCS-11-GW	Vinyl chloride	58 µg/L	10 µg/L	21, Appendix C, p. C31; 39, p. 1; 54, p. 48; 74

Notes:

CRQL Contract-required quantitation limit

DCE Dichloroethylene

FCS Flash Cleaners Site

GW Ground water sample

ID Identification number

µg/L Microgram per liter

PCE Tetrachloroethylene

TCE Trichloroethylene

U Analyte was not detected at or above the reporting limit

Adjusted CRQL = CLP CRQL for the analyte with any dilution factors and volume or weight adjustments for the analysis taken into account. For aqueous samples, adjusted CRQL = CLP CRQL \* (Contract Sample Volume / Volume Analyzed) \* Dilution Factor

### Attribution

Flash Cleaners conducted dry cleaning activities at the property from about 1977 to about 2001 (Ref. 9, p. 5). During a 1999 FDEP inspection at the facility, PCE was identified as the solvent used for dry cleaning activities (Refs. 6; 7, p. 1; 11, p. 1). During the 1999 FDEP inspection, two dry cleaning machines were located inside the building, one was operational and the other was not (Martin) (Refs. 6, p. 1; 7, p. 1). The operational machine was located within a secondary containment area; however, secondary containment was not provided for the non-operational machine (Refs. 6, p. 1; 7, p. 1; 11, p. 1). At that time, the facility owner/operator indicated that the non-operational machine still contained PCE (Refs. 6; 7; 11). Also during the inspection, FDEP personnel observed a drum of hazardous waste stored on the ground in the storage area located at the back of the Flash Cleaners building (Ref. 7, p. 2). At the time of the inspection, the facility operator indicated that during earlier years of operation, product and waste PCE, as well as separator and vacuum return wastewater were stored in drums in the storage area at the back of the Flash Cleaners building (Ref. 7, p. 2). However, manifests reviewed during the FDEP inspection did not support the storage of drummed wastewater in the Flash Cleaners storage area (Ref. 7, p. 2). Concentrations of PCE and TCE contained in the sludge sample collected from the Flash Cleaners septic tank in February 2001 were above the RCRA TCLP regulatory limits; therefore, the sludge was considered a hazardous waste that exhibited the characteristic of toxicity (Refs. 4, p. 7, Attachment 2; 41, p. 55). In April 2001, sludge contained in the septic tank was pumped out and disposed, and the septic tank was cleaned and inspected (Ref. 4, p. 7). The septic tank rinse water was scheduled to be disposed of and sludge that was pumped out of the septic tank was scheduled to be disposed of as hazardous waste (Ref. 4, pp. 7, 8, Attachment 3). No problems were noted with the interior of the septic tank during the inspection after the septic tank was cleaned; however, a blockage in the piping leading into the septic tank was observed and later repaired (Ref. 4, pp. 7, 8).

In June 2001, the BCPPRD notified the property owner that the septic tank sludge was characterized in the Source Removal report as hazardous waste due to the presence of high concentrations of chlorinated solvents (for example, PCE at 61,000 mg/kg). Further, the BCPPRD stated that "This is a clear indication that dry-cleaning solvents were released from the facility via the septic tank system. This is an unlawful and unauthorized release of hazardous materials to the environment and is a violation of Section 27-353 and 27-356(b), Broward County Code, and may be a violation of additional local, state, and federal requirements for the handling, storage, and disposal of hazardous materials" (Ref. 71, p. 1). BCPPRD requested that the property owner discontinue the use of the septic tank and connect to the sanitary sewer system. Also, BCPPRD indicated that further use of the septic tank may exacerbate or spread the ground water contamination plume (Ref. 71, p. 2). During BCPPRD inspections conducted in July and September 2002 at the facility, the septic tank was in use (Refs. 72, p. 1; 73, p. 1). In December 2007, Broward County Water and Wastewater Services indicated that sanitary sewer service is not yet available at the Flash Cleaners property (Ref. 57).

Analytical results of surface and subsurface soil and sludge samples collected from Source Nos. 1 and 2 between September 2000 to July 2005 contained site-related hazardous substances, including cis-1,2-DCE, trans-1,2-DCE, PCE, and TCE (see Tables 1 and 2 in Section 2.2.2 for Source Nos. 1 and 2 of this HRS documentation record). To date, no remediation of solvent-contaminated soils has occurred on the property (Ref. 21, pp. 3-4). Also, these hazardous substances have been documented as observed releases in permanent and temporary monitoring wells located on the Flash Cleaners property completed in the Biscayne aquifer. Concentrations of hazardous substances detected in soil and ground water samples collected in the immediate vicinity of the Flash Cleaners septic tank contain the highest concentrations of site-related hazardous substances (Refs. 10, p. 19, 24, 26, Appendix A; 13, Attachments 1 and 3; 21, Appendix A, p. A3, Appendix C) (also see Tables 13, 15, and 17 in Section 3.1.1, Observed Release, of this HRS documentation record).

Studies conducted in relation to the dry cleaning industry have concluded that sewer lines and septic systems are the main discharge points for separator, vacuum, and mop water from dry cleaners (Ref. 44, p. 9). Also, information gathered from contamination assessments from dry cleaning facilities in Florida indicates that the number one contaminant source area is the soil beneath the floor slab of the dry cleaning facility in the vicinity of the dry cleaning machines (Ref. 44, p. 9). The likely source of this contamination reportedly is the result of solvent waste discharges associated with filling the machine with solvent, operating the machine and distillation unit, and performing maintenance on the dry cleaning machine (Ref. 44, pp. 9, 10). Also, the second most commonly identified contaminant source area at Florida dry cleaning facilities is the area near the service door where solvent deliveries were received; solvent and spent cartridge filters were sometimes stored; and solvent-contaminated wastes (particularly contact water) were discharged (Ref. 44, pp. 9, 10). During the 1999 FDEP inspection, the waste storage area was located at the rear of the building (western side), in the vicinity of the back door. The septic tank also is located in this area (Refs. 6; 7) (also see Figures 3, 4, and 5 of this HRS documentation record).

In addition to Flash Cleaners, other potential sources of contamination may exist in the area (Refs. 45; 60). Web Auto World (formerly Cole Muffler), an auto repair shop, is located adjacent to the southern side of Flash Cleaners (Refs. 19, p. 18; 21, p. 3, Appendix A, p. A2; 37, p. 15). In May 2002, a focused Phase II investigation was conducted at the Cole Muffler property to determine whether subsurface soils and underlying ground water had been impacted by past auto repair and gasoline station activities at Cole Muffler and whether dry cleaning solvent releases from Flash Cleaners had impacted the Cole Muffler property (Ref. 43, p. 1). During the Cole Muffler Phase II investigation, 12 soil borings were advanced to depths ranging from 8 to 12 feet bgs until ground water was encountered. Nine borings (B-3 through B-9, B-11, and B-12) were advanced in areas of past gasoline and auto repair activities and downgradient of the septic tank and leachfield, and three borings (B-1, B-2, and B-10) were advanced adjacent to the Flash Cleaners property (Ref. 43, p. 2, Figure 3). Ethylbenzene and polynuclear aromatic hydrocarbons were detected in soil samples collected from areas formerly occupied by gasoline pumps (Ref. 43, pp. 4, 9, Appendix A, pp. A4, A10, A11). No other analytes were detected in the remaining soil samples (Ref. 43, p. 4, Appendix A). Ground water samples collected from the borings B-1 and B-2 adjacent to Flash Cleaners contained VOCs including PCE, cis-1,2-DCE and TCE above Florida Groundwater Cleanup Target Levels (Ref. 4, pp. 4, 9, 10, Appendix A, pp. A2, A3). No VOCs were present in any of the other ground water samples (Ref. 43, p. 4, 10, Appendix A). Based on the results of the Phase II investigation report, it was concluded that PCE, cis-1,2-DCE and TCE contamination at the Cole Muffler property resulted from releases from Flash Cleaners (Ref. 4, p. 6).

Five other dry cleaning facilities including Village Cleaners, Betty Brite Cleaners, Dry Cleaning Depot #36, Roberts Cleaners & Tailor, and Sun Fresh Laundry are located generally hydrologically cross-gradient from, and within a 1 mile radius of, the Flash Cleaners facility (Refs. 25, pp. 13, 33; 45, pp. 1, 2, Map). These facilities were identified as being contaminated sites in Broward County (Ref. 45, pp. 2 to 8, 30, Map). Based on the Broward County Contaminated Sites Map dated January 2007, the distance of these facilities from the Flash Cleaners facility is as follows: 0 to 0.5 mile, Village Cleaners and Betty Brite Cleaners; and 0.5 to 1 mile, Dry Cleaning Depot #36, Roberts Cleaners & Tailor, and Sun Fresh Laundry (Ref. 45, pp. 2, 30, Map). Betty Brite Cleaners, Dry Cleaning Depot #36, Roberts Cleaners & Tailor, and Sun Fresh Laundry are in the FDEP Drycleaning Solvent Cleanup Program (Ref. 45, pp. 2, 5 to 8).

Village Cleaners is located within 0.5 mile south of the Flash Cleaners facility (Ref. 45, Map). Village Cleaners is not in the FDEP Drycleaning Solvent Cleanup Program (Refs. 45, pp. 2, 6; 56). Low levels of solvent contamination exist on the Village Cleaners property; however, the plume is localized and has not moved off the property (Ref. 56). Betty Brite Cleaners is located within 0.5 mile southeast of Flash Cleaners and is in the FDEP Drycleaning Solvent Cleanup Program (Ref. 45, pp. 2, 6, 30, Map). In 1996, PCE was detected in a soil sample collected at the Betty Brite Cleaners property (Ref. 62, pp. 2, 3, 7, 8). Because of its low priority ranking, cleanup activities have not started at Betty Brite Cleaners (Ref. 63). The Betty Brite facility is now occupied by the Greener Cleaner and PCE is not used at that facility (Refs.



60, p. 2; 64). Dry Cleaning Depot #36, which is located within 1 mile southwest of the Flash Cleaners facility, is in the FDEP Drycleaning Solvent Cleanup Program (Ref. 45, pp. 2, 5, Map). Ground water remediation activities are ongoing at Dry Cleaning Depot #36 (Ref. 65, p. 4). Sun Fresh Laundry, located about 1 mile southwest of Flash Cleaners, is in the FDEP Drycleaning Solvent Cleanup Program (Ref. 45, pp. 2, 8, Map). Sun Fresh Laundry has been tasked for cleanup (Ref. 66, p. 9). Roberts Dry Cleaners & Tailor, located about 1 mile north of Flash Cleaners, is in the FDEP Drycleaning Solvent Cleanup Program and has been tasked for cleanup (Ref. 45, pp. 2, 7, Map; 66, p. 5).

Ground water samples collected at the Flash Cleaners facility indicate that the VOC contamination is localized, primarily in the vicinity of the septic tank area (Refs. 10, pp. 21, 26; 21, Appendix A, Figure 3, Appendix B, Table 6). VOCs were not detected in background ground water samples collected from areas on and in the vicinity of the Flash Cleaners facility where operational or disposal activities did not occur (Refs. 10, pp. 21, 26; 21, Appendix A, Figure 3, Appendix B, Table 6). The background ground water samples did not contain VOC contamination; therefore, the VOC contamination evaluated as attributable to Flash Cleaners is not being scored or evaluated as releases from the other dry cleaning facilities located within 1 radial mile of the Flash Cleaners facility (Refs. 10, pp. 21, 26; 13, p. 4, Attachment 6, p. 3; 21, Appendix B, Table 6) (see Tables 9, 10 and 11 of this HRS documentation record).

The hazardous substances listed below have been documented in sources located at the Flash Cleaners facility as well as in ground water underlying and northeast of the Flash Cleaners facility (see Tables 1 and 2 in Section 2.2.2 for Source Nos. 1 and 2, and Tables 13, 15, and 17 in Section 3.1.1, Observed Release, of this HRS documentation record). PCE was the dry cleaning solvent used when dry cleaning activities occurred at Flash Cleaners (Ref. 6, p. 1). Further, PCE and TCE have been used in the drycleaning industry since the early 1930s (Ref. 67, p. 2). Cis-1,2-DCE, trans-1,2-DCE, TCE, and vinyl chloride are degradation products of PCE (Refs. 35, pp. 1, 189, 190; 46, pp. 2, 81; 47, pp. 2, 169).

#### Hazardous Substances in the Release

Cis-1,2-Dichloroethylene  
Trans-1,2-Dichloroethylene  
Tetrachloroethylene  
Trichloroethylene  
Vinyl chloride

Ground Water Observed Release Factor Value: 550.00

### 3.1.2 POTENTIAL TO RELEASE

Potential to release was not evaluated for the Biscayne aquifer because an observed release has been documented (see Section 3.1.1 of this HRS documentation record).

## 3.2 WASTE CHARACTERISTICS

### 3.2.1 TOXICITY/MOBILITY

The toxicity and mobility factor values for the hazardous substances detected in the source samples with containment factor values of greater than 0 are summarized in Table 18. The combined toxicity and mobility factor values are assigned in accordance with Reference 1, Section 3.2.1. Hazardous substances detected in the observed release to ground water are assigned a mobility factor value of 1 (Ref. 1, Section 3.2.1.2).

TABLE 18: Ground Water Toxicity/Mobility						
Hazardous Substance	Source No.	Toxicity Factor Value	Mobility Factor Value	Does Hazardous Substance Meet Observed Release? (Yes/No)	Toxicity/Mobility (Table 3-9)	Reference
cis-1,2-DCE	1, 2	100	1 <sup>B</sup>	Yes	100	2, p. BI-5
trans-1,2-DCE	1, 2	100	1 <sup>B</sup>	Yes	100	2, p. BI-5
Tetrachloroethylene	1, 2	100	1 <sup>B</sup>	Yes	100	2, pp. BI-10
Trichloroethylene	1, 2	10,000	1 <sup>B</sup>	Yes	10,000	2, p. BI-16
Vinyl chloride	<sup>A</sup>	10,000	1 <sup>B</sup>	Yes	10,000	2, p. BI-12

Notes:

<sup>A</sup> Vinyl chloride was not detected in any of the soil samples collected at Flash Cleaners; however, it was detected in the ground water samples (Refs. 10, Appendix A, pp. A13, A16, A19; 21, Appendix C, pp. C15, C18, C22, C23, C31). Because vinyl chloride is a degradation product of tetrachloroethylene, it was included in the toxicity/mobility table (Ref. 47, p. 169).

<sup>B</sup> Documented in the observed release to ground water. A mobility factor value of 1 is assigned (Ref. 1, Section 3.2.1.2).

DCE      Dichloroethylene  
No.      Number

Toxicity/Mobility Factor Value: 10,000.00  
(Reference 1, Table 3-9)

### 3.2.2 HAZARDOUS WASTE QUANTITY

TABLE 19: Hazardous Waste Quantity		
Source No.	Source Type	Source Hazardous Waste Quantity
1	Contaminated soil	Undetermined, but greater than zero
2	Other	Undetermined, but greater than zero

The hazardous constituent quantity for Source Nos. 1 and 2 is not adequately determined. Their HWQ is undetermined, but greater than zero. As specified in Reference 1, Section 2.4.2.2, a HWQ factor value of 10 was assigned.

Hazardous Waste Quantity Factor Value: 10  
(Reference 1, Sec. 2.4.2.2)

### 3.2.3 WASTE CHARACTERISTICS FACTOR CATEGORY VALUE

The waste characteristics factor category was obtained by multiplying the toxicity/mobility and HWQ factor values, subject to a maximum product of  $1 \times 10^8$ . Based on this product, a value was assigned in accordance with Reference 1, Table 2-7.

Toxicity/Mobility Factor Value: 10,000.00  
Hazardous Waste Quantity Factor Value: 10

Toxicity/Mobility Factor Value  $\times$   
Hazardous Waste Quantity Factor Value: 100,000.00

Waste Characteristics Factor Category Value: 18  
(Reference 1, Table 2-7)

### 3.3 TARGETS

Residents in the vicinity of Flash Cleaners are provided drinking water from one of five municipal systems: the City of Deerfield Beach, the Town of Hillsboro Beach, Broward County District 2, and the City of Pompano Beach in Broward County, Florida; and the City of Boca Raton in Palm Beach County, Florida (Ref. 5). Municipal water systems and the locations of their wells within the 4-mile radius were verified by the South Florida Water Management District (SFWMD) (Ref. 68). The SFWMD permits municipal water systems in southeast Florida (Refs. 55; 68).

The City of Deerfield Beach maintains a total of 18 municipal wells, two are located within 1 to 2 miles and 16 are located within 2 to 3 miles north of the facility (Refs. 5; 28). None of the City of Deerfield Beach wells produce more than 40 percent of the total water supply. The water from all of the wells is mixed prior to distribution to the customers (Ref. 28). The City of Deerfield Beach wells collectively serve 52,749 people ( $52,749 \text{ people} \div 18 \text{ wells} = 2,931 \text{ people served per well}$ ) (Refs. 28; 29).

The Town of Hillsboro Beach maintains a total of three wells, which are located within 0.50 to 1-mile west of the Flash Cleaners property (Refs. 5; 30); however, one of the three wells is a standby well and was not used in calculating the population distribution (Ref. 30). Therefore, the two remaining Hillsboro Beach wells (both located within 0.5 to 1 mile of Flash Cleaners) collectively provide water to approximately 1,768 people (Refs. 5; 29; 30; 68).

The Broward County District 2 maintains 11 municipal wells, six are located within 0.5 to 1 mile and five are located within 1 to 2 miles northwest of the Flash Cleaners property (Refs. 5; 31). None of the wells provide more than 40 percent of the total water supply, and the water from the wells is mixed prior to distribution to the customers (Ref. 31, p. 3). The Broward County District 2 wells provide drinking water to 55,272 people (Refs. 29; 31). The Broward County District 2 is the sole provider of water to the City of Coconut Creek. The City of Coconut Creek resells the water to its customers (Ref. 50, pp. 3-1, 3-11 to 3-12). The City of Coconut Creek serves about 58,874 people. The population served by Broward County District 2 wells was determined by adding the population for Broward County District 2 and the City of Coconut Creek. Therefore,  $10,377 \text{ people are served by each Broward County District 2 well}$  ( $55,272 \text{ (Broward County District 2)} + 58,874 \text{ (Coconut Creek)} = 114,146 \div 11 \text{ wells} = 10,377$ ) (Refs. 5; 29; 31).

The City of Pompano Beach maintains a total of 25 wells and supplies drinking water to about 86,179 people (Refs. 5; 32). Therefore,  $3,447 \text{ people are served per well}$  ( $86,179 \text{ people} \div 25 \text{ wells} = 3,447$ ) (Ref. 32). None of the wells provide more than 40 percent of the total water supply, and the water from the wells is mixed prior to distribution to the customers (Ref. 32, p. 3). Fifteen of the City of Pompano Beach wells are located within the 4-mile radius (Ref. 5). Of the 15 wells, one is located within 1 to 2 miles, 10 are located within 2 to 3 miles, and four are located within 3 to 4 miles southwest of Flash Cleaners (Refs. 5; 51; 52).

The City of Boca Raton Utility Services in Palm Beach County, Florida serves a small area located between 3 to 4 miles north of Flash Cleaners (Refs. 5; 52). The City of Boca Raton Utility Services maintains 51 municipal wells that provide water to about 128,000 people (Ref. 51, p. 2). None of the City of Boca Raton Utility Services wells is located within a 4-mile radius of the Flash Cleaners facility (Ref. 68).

The service areas for the City of Deerfield Beach, Town of Hillsboro Beach, and Pompano Beach were obtained from Broward's County-wide Integrated Water Resource Plan (Ref. 20, p. 44). The service area for Broward County District 2 was obtained from the Broward County Water and Wastewater Systems Annual Report for Fiscal Year 2005 (Ref. 50, p. 3-3). The service area for the City of Boca Raton was obtained from the Boca Raton Comprehensive Plan (Ref. 52, p. 9).

Municipal wells located within a 4-mile radius of the Flash Cleaners property provide drinking water to about 220,378 people. The population served by these wells per distance ring is distributed as follows: 0

to 0.25 mile, 0 people; 0.25 to 0.50 mile, 0 people; 0.50 to 1 mile, 64,030 people; 1 to 2 miles, 61,194 people; 2 to 3 miles, 81,366 people; 3 to 4 miles, 13,788 people (Refs. 5; 28; 29; 30; 31; 32) (also see Table 20 of this HRS documentation record). The distance rings in which the municipal wells are located were verified by the SFWMD (Ref. 68). The population was apportioned based on the location of the wells; therefore, residents within 0.5 mile of the Flash Cleaners facility are provided drinking water from wells that are located further away from the Flash Cleaners property (Ref. 5). All of the wells in the area are screened in the Biscayne aquifer at a maximum depth of 200 feet (Refs. 25, p. 3; 28; 30; 31; 32). All municipal wells in Broward County have wellhead protection areas (Ref. 27, pp. 1 to 4); therefore, wellhead protection areas are located within the 4-mile radius of sources at Flash Cleaners (Refs. 5; 27).

**TABLE 20: Municipal Drinking Water Wells Within A 4-Mile Radius Of Flash Cleaners  
Biscayne Aquifer**

<b>Distance Ring Miles<sup>A</sup></b>	<b>Water System Name</b>	<b>Number of Wells</b>	<b>Depth (feet bls)</b>	<b>Level I Cont. (Y/N)</b>	<b>Level II Cont. (Y/N)</b>	<b>Potential Cont. (Y/N)</b>	<b>Population Served</b>	<b>References</b>
0.5 to 1	Broward County District 2	6	70 to 100	N	N	Y	62,262	5; 29; 31
0.5 to 1	Town of Hillsboro Beach	2	71 to 138	N	N	Y	1,768	5; 29; 30
1 to 2	Broward County District 2	5	70 to 100	N	N	Y	51,885	5; 29; 31
1 to 2	City of Deerfield Beach	2	60 to 100 and 150 to 200	N	N	Y	5,862	5; 28; 29
1 to 2	City of Pompano Beach	1	88 to 158	N	N	Y	3,447	5; 29; 32
2 to 3	City of Deerfield Beach	16	60 to 100 and 150 to 200	N	N	Y	46,896	5; 28; 29
2 to 3	City of Pompano Beach	10	88 to 158	N	N	Y	34,470	5; 29; 32
3 to 4	City of Pompano Beach	4	88 to 158	N	N	Y	13,788	5; 29; 32

Notes:

<sup>A</sup> The locations of the wells were verified by the SFWMD (Ref. 68).

bls Below land surface

Cont. Contamination

ID Identification number

N No

Y Yes

The population for the water systems listed in Table 18 was calculated as follows:

- Broward County District 2: 55,272 (Broward County District 2) + 58,874 (Coconut Creek) = 114,146 people ÷ 11 wells = 10,376.9 or 10,377 people (Refs. 5; 29; 31; 50, p. 3-1).
- City of Deerfield Beach: 52,749 people ÷ 18 wells = 2,930.5 or 2,931 people (Refs. 5; 28; 29).
- City of Pompano Beach: 86,179 people ÷ 25 wells = 3,447.16 or 3,447 people (Refs. 5; 29; 32).
- Town of Hillsboro Beach: 1,768 people, all wells are located within the 0.5 to 1 mile distance category (Refs. 5; 29; 30).

### **3.3.1 NEAREST WELL**

Well ID: Broward County District 2 and the Town of Hillsboro Beach have wells within 0.5 to 1 mile from the Flash Cleaners facility

Level of Contamination (I, II, or potential): Potential

If potential contamination, distance from source in miles: 0.5 to 1

Both the Broward County District 2 and the Town of Hillsboro have wells located within the 0.5 to 1 mile distance category from the Flash Cleaners facility (Ref. 5). The Broward County District 2 wells are located northwest of the Flash Cleaners facility and the Town of Hillsboro Beach wells are located west of the Flash Cleaners facility (Ref. 5). Due to homeland security concerns, exact well locations cannot be disclosed; however, the SFWMD has verified that the wells identified in this section are located within the 0.5 to 1 mile distance category (Ref. 68).

Nearest Well Factor Value: 9.00  
(Ref. 1, Table 3-11)

### **3.3.2 POPULATION**

#### **3.3.2.1 Level of Contamination**

##### **3.3.2.2 Level I Concentrations**

No Level I wells have been identified.

Level I Concentrations Factor Value: 0.00

##### **3.3.2.3 Level II Concentrations**

No Level II wells have been identified.

Level II Concentrations Factor Value: 0.00

### 3.3.2.4 Potential Contamination

Distance-weighted population values for potential contamination ground water targets for the Biscayne aquifer are presented in Table 21.

<b>TABLE 21: Distance-Weighted Population Values - Non-Karst</b>			
<b>Distance Category (Miles)</b>	<b>Population</b>	<b>Distance-Weighted Population Value (Ref. 1, Table 3-12)</b>	<b>References</b>
Greater than 0 to 1/4	0	0	5; 28; 29; 30; 31; 32
Greater than 1/4 to 1/2	0	0	5; 28; 29; 30; 31; 32
Greater than 1/2 to 1	64,030	16,684	5; 28; 29; 30; 31; 32
Greater than 1 to 2	61,194	9,385	5; 28; 29; 30; 31; 32
Greater than 2 to 3	81,366	6,778	5; 28; 29; 30; 31; 32
Greater than 3 to 4	13,788	1,306	5; 28; 29; 30; 31; 32

Calculations:

Sum of Distance - Weighted Population Values: 34,153

Sum of Distance - Weighted Population Values ÷ 10: 3,415.3

Potential Contamination Factor Value: 3,415.3

### 3.3.3 RESOURCES

Wells used for resources were not identified within a 4-mile radius of Flash Cleaners.

Resources Factor Value: 0.00

### 3.3.4 WELLHEAD PROTECTION AREA

All municipal wells in Broward County have wellhead protection areas (Ref. 27, pp. 1 to 4). The closest wells with wellhead protection areas are operated by the Broward County District 2 and Town of Hillsboro Beach located between 0.5 to 1 mile of the Flash Cleaners facility (Refs. 5; 68). Due to homeland security concerns, exact well locations cannot be disclosed; however, the SFWMD has verified that the wells identified in this section are located within the 0.5 to 1 mile distance category (Ref. 68).

Wellhead Protection Area Factor Value: 5.00